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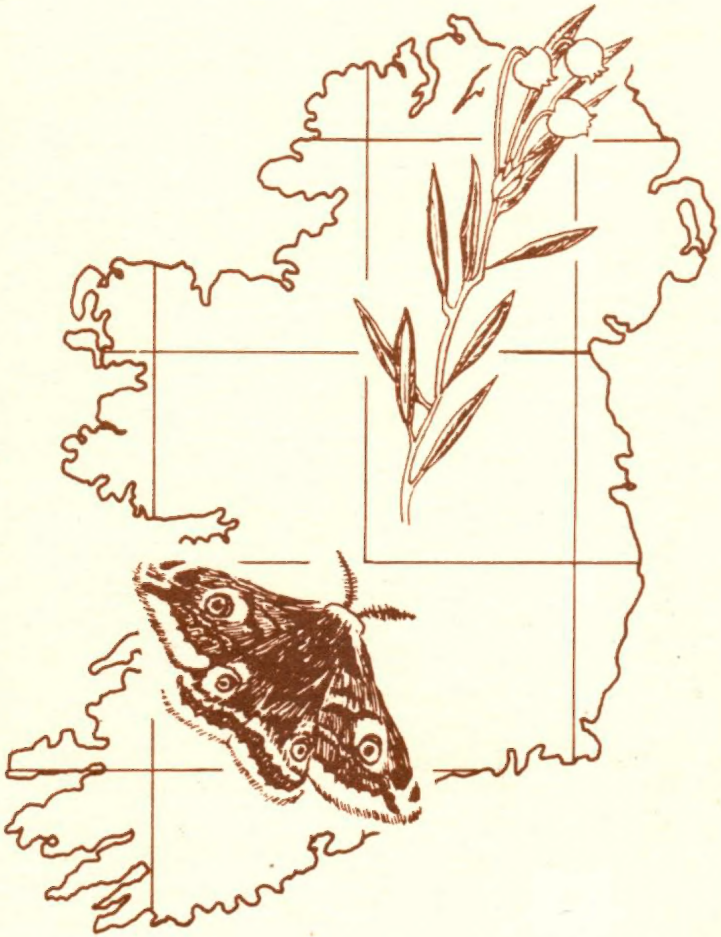

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DR MARCUS W. R. DE V. GRAHAM WHO DIED IN 1995, WAS A NOTABLE AUTHORITY ON THE HYMENOPTERA AND MADE A SIGNIFICANT CONTRIBUTION TO OUR KNOWLEDGE OF THE IRISH FAUNA. THIS BULLETIN IS DEDICATED TO HIS MEMORY IN RECOGNITION OF HIS GENEROUS AND COURAGEOUS ASSISTANCE TO THE IRISH BIOGEOGRAPHICAL SOCIETY.

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EDITORIAL

This year, readers will notice a major change in the format of the *Bulletin*. Over the last few years, a series of planned but gradual changes have been made to improve its appearance. With the installation of new computer facilities in the National Museum of Ireland, it has now been possible to complete this process. By using a new typeface, the number of words per page has been greatly increased. The Committee hopes that the new *Bulletin* meets with the approval of our members.

As in 1994, this year's *Bulletin* is a double issue and contains numerous interesting papers including major articles on the plants and Heteroptera of Northern Ireland, and the Irish Microlepidoptera.

On behalf of the Irish Biogeographical Society, I wish to thank our sponsors, the authors, the referees and all those who helped with this *Bulletin* including Dr C. F. Byrne, Dr J. M. Lynch and Mr N. T. Monaghan. We are especially grateful to Mr J. M. C. Holmes who provided invaluable assistance with its production and so good-humouredly coped with the many difficulties encountered while changing to the new computer system.

J. P. O'Connor
Editor
3 October 1995

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A REVIEW OF EUROPEAN CHALCIDOIDEA (HYMENOPTERA) PARASITIZING THE EGGS OF AQUATIC INSECTS

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Abstract

The chalcid egg-parasitoids of aquatic insects in Europe are reviewed. At present, two species of Trichogrammatidae, five species of Mymaridae and nine species of Eulophidae have been recorded in this group:- *Prestwichia aquatica*, *P. solitaria*, *Anagrus incarnatus*, *Caraphractus cinctus*, *Patasson leptoceras*, *Litus cynipseus*, *Anaphoidea conotrachelli*, *Mestocharis maculata*, *M. bimacularis*, *Aprostocetus natans*, *A. rimskykorsakovi*, *A. zerovae*, *A. citripes*, *A. pantschenkoi*, *A. pseudopodiellus* and *A. rufus*. The development of aquatic Chalcidoidea has been observed in the eggs of water-beetles (Coleoptera, Dytiscidae: *Dytiscus*, *Cybister*, *Agabus*, *Acilius*, *Ilibius*, *Noterus*, *Colymbetes*, *Graphoderus*; Hygrobiidae: *Hygrobia*), water bugs (Hemiptera: *Notonecta*, *Naucoris*, *Ranatra*, *Aphelocheirus*, *Gydrometra*, *Nepa*), dragonflies (Odonata: *Aeshna*, *Lestes*, *Calopteryx*, *Coenagrion*). The aquatic plants which are most attractive for the hosts' oviposition and their parasitoids have been established (*Alisma plantago*, *Sagittaria sagittifolia*, *Calla palustris*, *Nymphaea*, *Nuphar*, *Potamogeton*, *Hydrocharis*, *Stratiotes*, *Hippuris*, *Juncus*). The ability to swim under the water by means of legs (*Prestwichia*, *Patasson*) and wings (*Aprostocetus*, *Caraphractus*) has been observed.

Introduction

Three families of chalcid wasps (Trichogrammatidae, Mymaridae, Eulophidae) are known as egg-parasitoids of aquatic insects. The parasitoids follow their hosts into the water. The larvae and pupae of these Chalcidoidea live, strictly speaking, inside the egg of the hosts and only the adults can live in the water. In the literature, these insects are called aquatic chalcids or aquatic wasps. Actually, they are amphibiotic organisms because the adults can live directly in the water, run on the water surface and fly in the air. Some species (*Prestwichia aquatica*

Lubbock, *P. solitaria* Ruschka) are better adapted to the aquatic way of life and quickly die out of the water in the open air, but others (*Mestocharis bimacularis* Dalman) live in the air for a long time. Some aquatic chalcids have the unique capability to swim under the water by means of their legs (*Prestwichia*) and their wings (*Caraphractus*, *Aprostocetus*). Moving in this way in the water or the air, aquatic chalcids can successfully find and parasitize the eggs of their insects-hosts.

Material and methods

Material was collected by the author from 1981 to 1994 in various localities in the European part of Russia (Voronezh, Belgorod, Saint-Petersburg and Krasnodar Kray Districts), the Far East of Russia (Vladivostok), Ukraine (Kiev, Kharkov, Khmelnitskiy, Kherson, Nikolaev, Cherkassy, Poltava Districts and the Crimea), Hungary and England.

Collections were made in various aquatic habitats with a range of vegetation. They were mostly shallow, with slow flowing or mainly stagnant water. These included rivers and streams with slow current, large or small water ponds, temporary water-bodies like shallow water ponds, ditches for drainage and little ponds which dry out before the middle or the end of the summer.

From a review of the present data and the literature (*), the aquatic Chalicoidea have been reared from the eggs of different aquatic insects:- water-beetles (Coleoptera, Dytiscidae: *Dytiscus*, *Cybister*, *Agabus*, *Acilius*, *Ilibius*, *Noterus*, *Colymbetes**, *Graphoderus**, *Hygrobia**), water bugs (Hemiptera: *Notonecta**, *Naucoris*, *Ranatra*, *Aphelocheirus**, *Gydrometra**, *Nepa**), dragonflies (Odonata: *Aeshna*, *Agrion**, *Lestes**, *Calopteryx**, *Coenagrion*).

The most attractive aquatic plants for the hosts' oviposition are the following: *Alisma plantago-aquatica* L., *Sagittaria sagittifolia* L., *Calla palustris* L., *Nymphaea*, *Nuphar*, *Potamogeton*, *Hydrocharis*, *Stratiotes*, *Hippuris* and *Juncus*. The most productive plants for collecting from were *Alisma*, *Sagittaria*, *Nuphar* and *Nymphaea* since they are common and very visible.

The water-bugs, water-beetles and dragonflies frequently lay their eggs in the outer leaf stalks of *Alisma* and *Sagittaria* submerged under the water. In this position, the eggs have the best conditions for development surrounded by air and moisture in the hollows of air-filled leaf

stalks. The eggs are completely hidden but that affords no protection against egg-parasitoids as the chalcids have no difficulty in parasitizing them. The female inserts her ovipositor through the leaf tissue into the egg beneath or lays directly into the egg at the side of the leaf scar. The presence of the host's eggs can be recognized by the gashes and the scars in the plant tissue made by her ovipositor while inserting the eggs. The form, size and position of eggs in the tissue of the aquatic plants are specific and can be used for identifying the various species of water insects.

The injuries made by the host females on the aquatic plants (scars, gashes, holes) may be successfully used for finding the hidden eggs of aquatic insects. The females of *Dytiscus* make a long longitudional scar in the plant tissue of *Alisma* and insert their eggs inside. The eggs of *Cybister* and *Acilius* are placed in groups on both sides of special gashes or holes in the plant tissue. The egg of *Agabus* are laid separately in the plant tissue, and usually a small tongue of leaf tissue projects over the hole. The eggs of large dragonflies (*Aeshna*) are inserted in the plant tissue in a visible group, and frequently the small apices of the eggs project from the surface of a plant.

The eggs of aquatic insect-hosts were collected in the leaves and leaf stalks of various aquatic plants with different positions in the water and on the bottom. The plants were either submerged partially or completely under the water (*Sagittaria*), growing over the water surface (*Alisma*) or floating on the water (*Nuphar*). The aquatic chalcids successfully find and parasitize the host eggs in the tissue of aquatic plants either submerged under the surface (*Prestwichia*) or in the leaf stalks that appear over the surface of the water (*Mestocharis*).

The parasitized eggs inserted in the plant tissue were kept in small glass tubes (size 15mm x 40mm) with a part of the leaf stalk and water. Some host eggs were separated from the plant tissue and simply kept under the water in the tubes. It was better to save the eggs of Dytiscidae and Odonata, parasitized by Eulophidae, with a small part of the plant stalk in the tube. Such eggs became dark-brown, non-transparent and had a very fragile chorion. The eggs, parasitized by Trichogrammatidae and Mymaridae, were separated using pins from the plant tissues and submerged under the water in the tube. The chorion of such host eggs remained transparent and the contents became bright yellow or white. The development of the larvae of the parasitoids was visible inside these eggs.

The non-parasitized newly laid eggs of water beetles and water-bugs are transparent, usually cream-white and later the grey segments of the larva are visible.

Results and discussion

According to the present data and a literature review, two species of Trichogrammatidae, five species of Mymaridae and nine species of Eulophidae have been recorded in the complex of aquatic chalcids *viz. Prestwichia aquatica*, *P. solitaria*, *Anagrus incarnatus* Haliday, *Caraphractus cinctus* Walker, *Patasson leptoceras* DeBauche, *Litus cynipseus* Haliday, *Anaphoidea conotrachelli* Girault, *Mestocharis maculata* Förster, *M. bimacularis*, *Aprostocetus natans* Kostyukov and Fursov, *A. rimskykorsakovi* Kostyukov and Fursov, *A. zerovae* Kostyukov and Fursov, *A. citripes* (Thomson), *A. pantschenkoi* Kostyukov, *A. pseudopodiellus* Bakkendorf and *A. rufus* Bakkendorf.

The data from the literature are given in Table 1. Trophic specializations were studied by the author and are shown in Table 2.

The egg-parasitoids of water-beetles develop in the eggs of different species during the annual season. In May-June, the first generation of chalcids (*Prestwichia*, *Patasson*, *Mestocharis* and *Aprostocetus*) parasitize the large eggs of *Dytiscus* and *Cybister*. The second, third and fourth generations of the parasitoids appear in June-July, August and September approximately and develop in the small eggs of other water beetles (*Agabus*, *Acilius*, *Ilibius*, *Noterus*, etc.). Later the parasitoids in the prepupal and pupal stages hibernate inside the host eggs under the water. In the Ukraine, four generations of *Prestwichia aquatica*, three of *Caraphractus cinctus* and three to four of *Mestocharis bimacularis* were recorded. The size and number of individuals depend upon the size of the host eggs. From a single egg of *Dytiscus*, 178 individuals of *P. aquatica*, (usually 10-20), or 104 individuals of *C. cinctus* (commonly 25-35) or up to 44 individuals of *M. bimacularis* (usually 8-9) were reared. From one egg of *Acilius* up to 45 individuals of *P. aquatica* (usually 7-8) and up to 13 from one egg of *Agabus* (usually 4-5) were reared. The development of two to six individuals of *C. cinctus* in one egg of *Agabus*, three individuals of *M. bimacularis* in one egg of *Acilius* was recorded.

Rimsky-Korsakov (1916) and Jackson (1956) observed that, in *P. aquatica* and *C. cinctus*, arrhenotokous parthenogenesis occurs as in most parasitic Hymenoptera where an unmated

female will produce only male progeny while a mated one can deposit both fertilized and unfertilized eggs.

Jackson (1956, 1959) observed that in *C. cinctus* the wing size usually varied in accordance with the size of insect and intermediates occurred between the large specimens with long wings and the small specimens with short wings. There are often micropterous individuals of *C. cinctus* in the cases of superparasitization. Rimsky-Korsakov (1920) indicated two races of *P. aquatica*: fully winged (macropterous females) and short winged (brachypterous females). He mentioned that these two forms did not integrate, but the author has found intermediate forms of winged females with partially reduced ciliation of their wings.

It was noted that the parasitoids lay their eggs in the host eggs at all stages of their development, but later stages are less attractive for the parasitoids. Parasitoids usually reject the host eggs that are already parasitized. According to Ivanova-Kazas (1950), twofold and multifold parasitizations relatively often happen. Rimsky-Korsakov (1916, 1931) recorded that it is possible to find several larvae of *P. aquatica* in different stages of development in a single host egg. In some cases of twofold parasitization there are two distinctive and separate age groups of larvae without intermediate stages.

Cases of combined parasitization were also observed. The larvae of *P. aquatica* may be found simultaneously with larvae of *C. cinctus* and *M. bimacularis* inside one host egg. The larvae of *P. aquatica* are sack-formed and successfully develop together with larvae of *C. cinctus*. The gregarious larvae of *P. aquatica* and *C. cinctus* do not attack one another. The larvae of *Mestocharis* have sharp mandibles and may actively kill the larvae of other parasitoids including those of the same species. Occasional superparasitism was observed when a female of *P. aquatica* laid its eggs inside the later stages of the larvae of *C. cinctus* (Rimsky-Korsakov, 1920, 1931; Ivanova-Kazas, 1950).

The ability to swim under the water is specific for *P. aquatica* and *C. cinctus*. The females and males of *P. aquatica* dive beneath the surface of the water and swim by means of rapid movements of their legs, keeping their wings folded on the back of body. The adult of *C. cinctus* swims by using the wings, intensively paddling under the water. The under water swimming of *Aprostocetus natans* was first observed by the author (Fursov and Kostyukov, 1987).

C. cinctus can also quicky move on the surface of the water and fly freely in the air. The females of *P. aquatica* are poor fliers but can still jump and open their wings. According to Rimsky-Korsakov (1916) and Jackson (1961), the mating of adults of *P. aquatica* and *C. cinctus* has been observed within submerged host eggs. The imago of *P. aquatica* can remain under the water for up to five days (Heymons, 1909). Such species as *P. leptoceras* and *A. incarnatus* can not swim but only move slowly under the water with opened wings. *M. bimacularis* and *M. maculata* do not like to go under the water and do not swim (Jackson, 1950, 1964). Usually these species prefer to parasitize the eggs of Dytiscidae in the plant tissue over the water.

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TABLE 1. List of European Chalcidoidea parasitizing the eggs of aquatic insects.

PARASITE	HOST	LITERATURE
Prestwichia aquatica Lubbock	**Hemiptera: Ranatra linearis L.**	Heymons, 1909
	Hemiptera: Nepa, Notonecta, Aphelocheirus.	Rimsky-Korsakov, 1931
	Coleoptera: Dytiscus, Cybister, Acilius, Agabus.	Rimsky-Korsakov, 1916
	Coleoptera: Colymbetes.	Enock, 1899
	Coleoptera: Hygrobia.	Enock, 1896
P. solitaria Ruschka	**Coleoptera: Graphoderus, Agabus.**	Henriksen, 1922
	Odonata: Aeshna, Lestes.	Rimsky-Korsakov, 1916
	Odonata: Erythromma najas Hans.	Henriksen, 1922
Caraphractus cinctus Walker	**Coleoptera: Ilibius, Dytiscus.**	Rimsky-Korsakov, 1925
	Coleoptera: Acilius, Graphoderus bilineatus Degeer.	Ivanova-Kazas, 1954
	Coleoptera: Ilibius ater Degeer, I. fuliginosus Fabr., Colymbetes fuscus L., Hydroporus planus Fabr., Agabus bipustulatus Gyllenhal, A. labiatus Brahm., A. sturmii Gyllenhal, A. nebulosus Forster, A. chalconatus Panzer, Dytiscus marginalis L.	Jackson, 1958
	Coleoptera: D. semisulcatus Müller	Jackson, 1964
	Hemiptera: Notonecta glauca L.	Matheson & Crosby, 1912
Anagrus incarnatus Haliday	**Odonata: Coenagrion, Lestes, Calopteryx virgo L.**	Rimsky-Korsakov, 1916
	Odonata: Erythromma.	Rimsky-Korsakov, 1931
	Odonata: Coenagrion pulchellum Lind.	Henriksen, 1922
Patasson leptoceras Debauche	**Coleoptera: Ilibius fuliginosus F.**	Hinks, 1959
Litus cynipseus Haliday	**Hemiptera: Gydrometra.**	Brocher, 1910
Anaphoidea conotrachelli Girault	**Coleoptera: Agabus.**	Bakkendorf, 1934

Aprostocetus pseudopodiellus Bakk.	**Odonata: Lestes.**	Bakkendorf, 1953
A. rimskykorsakovi Kost. & Furs.	**Odonata: Aeshnidae.**	Fursov & Kostyukov, 1987
A. rufus Bakk.	**Coleoptera: Dytiscus.**	Bakkendorf, 1953
A. citripes (Thomson)	**Coleoptera: Agabus, Ilibius.**	Fursov & Kostyukov, 1987; Graham & LaSalle, 1991
A. zerovae Kost, & Furs.	**Odonata: Aeshnidae.**	Fursov & Kostyukov, 1987
A. pantschenkoi Kost.	**Coleoptera: Dytiscus, Agabus, Cybister, Acilius.**	Fursov & Kostyukov, 1987
A. natans Kost. & Furs.	**Coleoptera: Agabus, Ilibius.**	Fursov & Kostyukov, 1987
Mesocharis bimacularis Dalman	**Coleoptera: D. marginalis, D. circumflexus F., D. semisulcatus.**	Jackson, 1964
	Coleoptera: Graphoderus.	Henriksen, 1919
	Coleoptera: Acilius, Agabus.	Ivanova-Kazas, 1961
M. maculata Förster	**Coleoptera: Dytiscus.**	Boucek *et al.*, 1963

TABLE 2. Trophic connections of aquatic Chalcidoidea parasitizing the eggs of aquatic insects in the Ukraine and Russia.

PARASITE TAXA	HOST TAXA									
	Dytiscus	Cybister	Acilius	Agabus	Ilibius	Noterus	Naucoris	Ranatra	Aeshna	Coenagrion
	1	2	3	4	5	6	7	8	9	10
Prestwichia aquatica	X	X	X	X	X	X	X	X		
P. solitaria				X					X	X
Caraphractus cinctus	X			X	X					
Anagrus incarnatus										X
Patasson leptoceras				X	X					
Aprostocetus rimskykorsakovi									X	
A. citripes				X	X					
A. zerovae									X	
A. pantschenkoi	X	X		X	X					
A. natans				X	X					
Mestocharis bimacularis	X	X	X	X	X					
M. maculata			X	X						

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PARASITIC COPEPODA ASSOCIATED WITH TELEOSTS IN KILLARY HARBOUR, IRELAND

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Many fish species harbour parasitic copepods. These parasites are most commonly found attached to the gills, or in the gill chambers, but may also be found in the mouth, in the nasal cavities, associated with the fins, or sometimes on the smooth external surfaces of the body.

The parasitic copepods of the western seaboard of Europe and the north east Atlantic are well known and most species likely to be found in Irish waters were illustrated by Kabata (1979). However, records relating specifically to Ireland are suprisingly sparse. The most important reviews of the Irish fauna were by Pearson (1905) and O'Riordan (1966) but, in all probability, many more species remain to be recorded from Irish waters.

Killary Harbour, between counties Galway and Mayo, is a fjord-like inlet, without a sill but with deep water (42m) near its entrance. The sea floor gradually shallows from the seaward end towards the estuary of the Eriff River at the head.

In July 1993, samples of fish were taken from beside a fish farm at Rosroe (grid reference L770651), Killary Harbour, and also to seaward of the farm towards Inishbarna. The area studied is close to the entrance of the harbour. Here there is an influence of coastal water with occasional inundations of brackish water which pass down the length of the harbour, past its entrance, to a maximum depth of about 6-8m. Salinities under these conditions can fall to 20 parts per thousand at the surface.

Fish from the vicinity of the farm were taken by rod and line, and to seaward towards Inishbarna by means of fish traps baited with mussels. Traps were fished on and near areas of rock. The traps were intended to capture two species of the wrasse family, *viz.* corkwing *Crenilabrus melops* (L.) and goldsinny *Ctenolabrus rupestris* (L.), with the further intention of using these for control of sea-lice *Lepeophtheirus salmonis* (Krøyer) and *Caligus elongatus* von

Nordmann on cultivated salmon.

The following fish species were taken:- lesser spotted dogfish *Scyliorhinus canicula* (L.); salmon *Salmo salar* L.; trout *Salmo trutta* L.; conger eel *Conger conger* (L.); shore rockling *Gaidropsarus mediterraneus* (L.); three-bearded rockling *Gaidropsarus vulgaris* (Cloquet); whiting *Merlangius merlangus* (L.); pollack *Pollachius pollachius* (L.); coalfish *Pollachius virens* (L.); john dory *Zeus faber* L.; corkwing; goldsinny; ballan wrasse *Labrus bergylta* Ascanius; mackerel *Scomber scombrus* L. and rock goby *Gobius paganellus* L.

Most of the fish were examined for copepod parasites. However, the goldsinny and corkwing wrasses were not examined as these were placed directly into cages following capture. Eleven species of parasitic copepod were recovered, including one species yet to be described. Trematodes were found on dogfish and conger, but these were not identified.

A selection of the material is deposited in the National Museum of Ireland.

Order Siphonostomatoida

Family Caligidae

***Caligus centrodonti* Baird, 1850**

1♂ 4 juvenile, from *Labrus bergylta* (TL 210mm), 14 July 1993; 2♂ 1♀ 2 juvenile, from *L. bergylta*, 15 July 1993; 3♂ 1 juvenile, from *L. bergylta*, 23 July 1993; 1♂ 3♀ 1 juvenile, from *L. bergylta*, 23 July 1993; 3♂ 2♀, from *L. bergylta*, 26 July 1993; 2♂ 3♀ 41 juvenile, from *L. bergylta* (TL 205mm), 26 July 1993; 1♂ 1♀, from *L. bergylta*, 26 July 1993.

C. centrodonti was described by Kabata (1992) as a rather rare species around the British Isles. His listing of it from the Irish Sea is in all probability based on an old record from Dublin (Baird, 1850). Its hosts include the labrid fishes and other percoid fish such as the red sea-bream *Pagellus bogaraveo* (Brünnich).

***Caligus elongatus* von Nordmann, 1832**

4♂ 1♀ 1 juvenile, from *Pollachius virens*, July 1993; 2♂, from large *Pollachius pollachius*, July 1993; 1♀, from *Scomber scombrus*, July 1993; 1♀, from *Gobius paganellus*, 23 July 1993; 3♀, from *S. scombrus*, 31 July 1993.

C. elongatus is common around the British Isles and has been recorded from more than 80 species of fish (Kabata, 1992). It is often found free-swimming and has been taken in light-

traps (Holmes and O'Connor, 1991). In July 1993 *C. elongatus* infestation at the fish farm was high and, when the salmon were being harvested, *C. elongatus* were seen to detach and swim freely in the water. Its discovery on *Gobius paganellus* constitutes a new host record, but this occurrence could be explained by the above events. Some of the specimens of *C. elongatus* were infested by the trematode *Udonella caligorum* Johnston.

***Caligus labracis* T.Scott, 1902**

4♀, from *Labrus bergylta*, 26 July 1993; 1♀, from *L. bergylta*, 29 July 1993.

The above find of five *C. labracis* constitutes the first record of its occurrence within Irish waters. Kabata (1979, 1992) referred to its distribution as British waters (Irish Sea), south coast of Cornwall, and England. The species has so far been found exclusively on wrasses of the genus *Labrus*. In this study the wrasses *C. rupestris* and *C. melops* were captured in nets but were not examined so as not to stress these fish intended for sea-lice control.

***Caligus pelamydis* Krøyer, 1863**

1♀, from *Pollachius virens*, rod and line, July 1993; 2♀, from *Scomber scombrus*, July 1993.

C. pelamydis is known from a number of fish species, most commonly *S. scombrus*. *S. scombrus* at the nearby fish farm were feeding on fish food pellets that had either passed through the fish cage netting or got spilt during the feeding process. Rod-caught *S. scombrus* were found with many food pellets, many disintegrated, within their gut. When the *S. scombrus* were feeding, *P. virens*, *P. pollachius*, *G. morhua* and *M. merlangius* were also captured. The close proximity of *P. virens* and *S. scombrus* with each other and with the cages may explain this new host record, although *P. virens* might not be a normal host of this copepod.

Since 1989, studies of parasites of *S. scombrus* in the vicinity of the fish farm have revealed significant numbers of *C. pelamydis*, notably in the gill cavity areas. It is noted that infestations seemed relatively low in July 1993, although the sample size was small.

***Caligus zei* Norman and T.Scott, 1906**

4♂ 18♀, from *Zeus faber*, 14 July 1993.

Z. faber is the normal host of *C. zei*, although Kabata (1979) regarded it as not common. The large number of parasites found in this study on a single host is remarkable, and further monitoring of this interaction will be carried out. The only previous certain Irish record of this copepod species is of two female specimens from Long Island Sound, Co.Cork (O'Riordan,

1966). These were taken during the Royal Irish Academy expedition of 1886; host unspecified. The specimens, lodged in NMI, were labelled "*Caligus macrurus* n. sp." by Canon A. M. Norman, but this manuscript name was apparently never published. Other records in O'Riordan (1966), from Bantry Bay, Co. Cork, should be referred to *C. elongatus*.

***Lepeophtheirus salmonis* (Krøyer, 1838)**

5♀, from *Pollachius virens*, 29 July 1993.

L. salmonis is normally found on salmonid fish, although a small number of other, possibly accidental, hosts were listed by Kabata (1992). The copepod was present on *S. salar* in the fish farm, and this may account for the above new host record on coalfish.

***Pseudocaligus brevipedis* (Bassett-Smith, 1896)**

1♂ 2♀, from *Gaidropsarus vulgaris* (TL 218mm), 14 July 1993; 2♂ 4♀, from *G. vulgaris* (TL 241mm), 14 July 1993; 6♂ 15♀, from *G. vulgaris*, 15 July 1993; 1♀, from *Labrus bergylta*, 23 July 1993; 2♂ 1♀, from *G. vulgaris*, 23 July 1993; 1♂, from *Conger conger*, 23 July 1993; 1♀, from small *L. bergylta*, 26 July 1993; 5♂ 11♀ 3 juvenile, from *G. vulgaris*, 26 July 1993; 1 juvenile, from *G. mediterraneus*, 29 July 1993; 9♂ 12♀ 4 juvenile, from *G. vulgaris*, 29 July 1993.

The presence of *P. brevipedis* on *G. mediterraneus* is of interest. Of some sixty specimens of this fish examined, only one copepod was found, whereas many specimens of *G. vulgaris* harboured the parasite.

Family Pennellidae

***Lernaeocera branchialis* (L., 1767)**

Several specimens, from gills of *Merlangius merlangus*, July 1993.

L. branchialis is a well-known parasite on the gills of gadid fishes (Kabata, 1992).

Order Poecilostomatoida

Family Taeniacanthidae

***Taeniacanthus onosi* (T.Scott, 1902)**

1♀, from *Gaidropsarus vulgaris*, 23 July 1993; 1♀, from *G. vulgaris*, 26 July 1993; 1♀, from *G. vulgaris*, 29 July 1993.

T. onosi lives on several rockling species (Holmes and Gotto, 1992). It may be common around Ireland but has probably been under-recorded due to its small size - length about

1.3mm. Nevertheless, in this study, it was not found on *G. mediterraneus*, despite careful examination.

***Taeniastrotos* sp.**

3♀, from the external surface of a single small *Conger conger*, 23 July 1993.

The genus *Taeniastrotos* was reviewed, along with other taeniacanthids, by Dojiri and Cressey (1987). The present copepods have the characteristic corrugated shield-like structure on the ventral surface of the rostral area, but otherwise do not appear to belong to any of the four known species making up this Indo-Pacific genus. A detailed description of the new form is in preparation.

Family Chondracanthidae

***Chondracanthus zei* Delaroche, 1811**

2♀, from *Zeus faber*, 14 July 1993.

C. zei lives on zeid fishes, as the name suggests. Previous Irish records were reviewed by Holmes and Gotto (1992).

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A REVIEW OF THE IRISH DISTRIBUTION OF *ARCTORTHEZIA CATAPHRACTA* (OLAFSEN) (HEMIPTERA: COCCOIDEA)

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Arctorthezia cataphracta (Olafsen) belongs to the Ortheziidae, the members of which are the least modified of all Coccoidea (Dolling, 1991). Little appears to be known concerning the ecology of *A. cataphracta*, but it has been found with its mouthparts inserted into the stipe of a basidiomycete fungus in a mixed wood in England (Thorpe, 1968). Newstead (1903) describes its habitat as chiefly among moss, about the bases of the stems of various grasses, sedges (*Carex*), heather, or among dead leaves and debris beneath moss. It has also been collected from lichens, *Calluna*, *Carex*, *Geranium*, *Hymogyne*, *Saxifraga* and *Soldanella* and is cryptic in behaviour (Watson, pers. comm.). Dolling (1991) states that it is sometimes abundant under stones in the high glens of Scotland. The species has a circumpolar distribution, being known from Alaska, Belgium, England, Faroe Islands, Finland, France, Greenland, Hebrides Islands, Iceland, Ireland, Kamchatka Peninsula, Norway, Poland, Scotland, Spitzbergen, Switzerland and the former U.S.S.R. (Green, 1928; Morrison, 1952).

The recent discovery of specimens by SW in Ireland has prompted the authors to review the known distribution of *A. cataphracta* on the island. It was first recorded by Douglas (1881) who gave no details other than "Ireland". Subsequently, Carpenter (1894) exhibited female specimens at a meeting of the Dublin Microscopical Club. These had been collected at the foot of Slieve Glah, Co. Cavan, by J. N. Halbert. Carpenter stated that H. C. Hart was the first to notice it in Ireland (in 1880) in Cos Donegal and Wicklow. He added that W. F. Johnson had also found it near Armagh. Halbert (1895) reported the finding of several beautifully fresh females in moss, near the tops of the cliffs, at the back of Lord Howth's demense (Co. Dublin) on 9 March 1894. He had also taken specimens on Bray Head (Co. Wicklow) and near Dingle (Co. Kerry). In his monograph on the Coccoidea, Newstead (1903) noted that Mr Brocton

Tomlin had informed him that it was extremely common in Co. Antrim, commenting that he had been sent examples from there over the last three years. In the Clare Island Survey, Halbert (1912) recorded *A. cataphracta* from Achill, Clare Island, Louisburgh and Westport, all in Co. Mayo. It occurred commonly in moss throughout the district, especially on the mountains, as on Croaghmore and Croaghpatrick. There are also old specimens in the National Museum of Ireland from Kenbane (Co. Antrim), Glenveagh (Co. Donegal) and Kenmare (Co. Kerry). The authors have been unable to trace any more recent records.

Between 1986 and 1990, SW recorded the species at various locations in south-west and west Ireland and in 1994 from Wicklow (Table 1). In most cases, specimens were seen while collecting or examining *Saxifraga spathularis* Brot. The insects occurred amongst the roots of this species and associated mosses, usually with very little mineral soil. *A. cataphracta* was apparently feeding on the saxifrage roots. However, they did not persist when the plants were brought into cultivation and did not appear to seriously harm the plants. The micro-habitats were usually moss growing over boulders or rock faces, and subject to at least periodic drying. Specimens were not found on the closely related *S. hirsuta* L. *A. cataphracta* is now known from Cos Antrim, Armagh, Cavan, Donegal, Dublin, Galway, Kerry, Mayo and Wicklow.

Voucher specimens from Derrycunihy have been deposited in the National Museum of Ireland.

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TABLE 1. New locations for *Arctothezia cataphracta* (Olafsen) in Ireland.

Locations	**Geology**	**habitat**	**dates**
SOUTH KERRY (VC1)			
Waterville V540649	Old Red Sandstone	Steep rocky bank in Oak/birch woodland at 20m (N)	1.vii.1989
Ballaghbeama Gap V770761	ditto	Rocky cliff faces on pass at 200m (N)	x.1990
Connor Pass Q498056	Dingle Beds	Rock face alongside road at 500m (NW)	1987
NORTH KERRY (VC2)			
Derrycunihy V909814	ditto	on flattish tops of boulders in oak woodland at 35m	iv.1986 also 1987, 1989
Cromaglan V921822	ditto	Rock face alongside road at 30m (NW)	vii.1986
WEST GALWAY (VC16)			
Kylemore Lough L783586	Schists	Rocky slopes in open plantation at 50m (S)	29.vii. and 14.ix.1990
WICKLOW (VC20)			
Devil's Glen T239988	Cambrian greywackes	On moss-covered rockfaces in deep valley	26.ix.1994

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WOODLAND POLYPORE FUNGI AND OTHER MICROHABITATS OF STAPHYLINIDAE (COLEOPTERA) AT POWERSCOURT DEMESNE, CO. WICKLOW, IRELAND

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In memory of the late Dr G. A. Lohse (1911-1994) and in recognition of his immense contribution to the study of European Staphylinidae

Introduction

The woodland at Powerscourt Demesne and Charleville Estate near Enniskerry, Co. Wicklow, was listed as an Area of Scientific Interest based on botanical and ornithological criteria (Anon., 1981), and the site was also noted as having a rich macrofungus flora (Curtis and Young, 1976). In the autumn of 1990 an Environmental Impact Statement (EIS) was commissioned for a development in Powerscourt Demesne, part of which required an identification of woodland habitats of value for invertebrate fauna. Staphylinid beetles were considered appropriate as an indicator group for this purpose because they are a species-rich group with many species associated with woodland decomposition microhabitats, and they can be sampled as adults throughout the year. Although Powerscourt is a well-known area entomologically, the vast majority of previous records refer to 'Powerscourt Deerpark', which is c.3km from the Demesne.

The woodland consists of conifer and broadleaf plantations, stands of mature beech (*Fagus sylvatica* L.), areas dominated by mature exotic tree and shrub species planted in the last century, and areas of native vegetation with oak (*Quercus* sp.), ash (*Fraxinus excelsior* L.) and alder (*Alnus glutinosa* (L.) Gaertn.). Laurel (*Prunus laurocerasus* L.) and *Rhododendron ponticum* L. have extensively invaded the understorey in much of the woodland, and *Carex*

pendula Hudson occurs beside stream margins.

Methods

Six microhabitats were selected for sampling:- (1) Woodland moss, O2217, 9 September 1990. Moss was removed from c.0.3m^3 of the floor of a young sycamore-ash (*Acer pseudoplatanus* L. and *Fraxinus excelsior*) woodland on sandy soil, particularly from the base of tree trunks, and sorted and extracted in Tullgren funnels; (2) Polypore fungus, O2217, 30 September 1990. Both living and fallen (decomposing) *Meripilus giganteus* (Pers. ex Fr.) Karst (Polyporaceae) were removed from a fallen over-mature beech (c.1.2m dbh), and similarly sorted and extracted; (3) Polypore fungus, O2217, 31 September 1990. Several examples of *Daedalea quercina* (L. ex Fr.) (Polyporaceae), which had extensively colonised a very decomposed *Quercus* stump, were removed and wetted with water to extract inhabitants; (4) *Ulex* pasture, O2116, 23 September 1990. A small south-facing pasture surrounded by woodland, and with extensive invading gorse (*Ulex europaeus* L.), was sampled using a D-vac suction sampler; (5) *Carex pendula*, O2216, 23 September - 5 October 1990. Plastic cup pitfall traps (n=8, ethylene glycol preservative) were laid in an area of flat almost-bare alluvial silt with *Carex pendula* and *Heracleum montegazzianum* Sommier and Levier under *Fraxinus* canopy; (6) Bark, O2216, 15 September 1990. Subcorticolous beetles were collected by removing bark from fallen *Pseudotsuga* trunks with a hammer and chisel.

Species were selected as indicators of well-developed habitat on the basis of the combination of two attributes:- (1) restricted habitat preference to a specific type of woodland microhabitat; (2) reported in the literature as being uncommon or local, suggesting that they are less likely to survive in historically degraded ecosystems. Voucher specimens of *Atheta picipes* and *Gyrophaena strictula* have been deposited in the National Museum of Ireland, and specimens of *Aloconota sulcifrons* and many of the other species have been retained in the senior author's collection.

Results

In total 56 species of staphylinid were recorded (Table 1), the following three of which are considered indicators of well-developed woodland habitat.

Atheta picipes (Thomson) is recorded in Ireland from near Lough Neagh (O'Mahony, 1929). Although widespread in Scotland, the species is local in Britain and is listed as notable (scarce) by Hyman and Parsons (1994). It also appears to be widespread but uncommon in Sweden and Central Europe (Palm, 1970; Benick and Lohse, 1974). It is regarded as eurytopic by Koch (1989), but if potential overwintering habitats such as grass tussocks, moss, compost, etc., are excluded, it would appear to be especially associated with fungi - a point confirmed by the observations of Palm (1959).

Many of the specimens of *Atheta picipes* collected in this survey fit the description of *A. olbrichi* Scheerpeltz given in Lohse and Lucht (1989), which is known in Europe only from Austria and Hungary (Lohse and Lucht, 1989). As it can be reliably distinguished from *A. picipes* only on the basis of a single secondary sexual character in the male (the aedeagus appears identical), its specific status cannot be readily accepted. (Dr G. A. Lohse (pers. comm.), who confirmed the Powerscourt specimens as *olbrichi*, also doubted its specific status.) Until further taxonomic or ecological information becomes available, this taxon must be treated as a subspecific form of *picipes*. Furthermore, as the Austrian record is from a zoo, and as this record is from an arboretum site, importation of *olbrichi* to Powerscourt with some of the exotic plants in the last century cannot be discounted.

Good (1991) reported the first Irish record of *Gyrophaena strictula* Erichson from this site. It is a species particularly associated with the polypore fungus *Daedalea quercina*, and is local in Britain (Hyman and Parsons, 1994). The larvae of species of *Gyrophaena* feed on spores of fungal fruiting bodies (Ashe, 1984).

Aloconota sulcifrons (Stephens) is a stenotopic ripicolous species (Koch, 1989), occurring in rivulets in woods and margins of open water on river banks, marshes, etc. (Palm, 1970). There is a single record cited in Johnson and Halbert (1902) from Dundrum (Co. Dublin), and it has not generally been recorded as a common species (Fowler, 1888; Palm, 1970).

Discussion

Saproxylic and other woodland invertebrates are very poorly represented in Ireland (Speight, 1986, 1989). Nevertheless, many of the species which occur in Ireland and in other parts of western Atlantic Europe are restricted to limited areas of old woodland landscape. Polypore

fungi are an important habitat for staphylinids and probably a whole range of invertebrates in Powerscourt Demesne, as indicated by the presence of *Atheta picipes* and *Gyrophaena strictula*. However, *G. strictula* was associated with the bracket fungus *Daedalea quercina*, which occurred on a large oak stump in advanced decay in a conifer plantation, and *A. picipes* with *Meripilus giganteus* growing on a fallen beech (*Fagus*) trunk under tree canopy. These types of microhabitat (especially old oak stumps) were relatively scarce in the site, and probably their faunal richness is more a result of the availability of microhabitats throughout the woodlands near Enniskerry, than of its availability within Powerscourt Demesne *per se*.

Woodland streams are known to be important conservation features (Peterken, 1981), and the presence of *Aloconota sulcifrons* would indicate that they may be important in this site. However, more sampling effort is necessary to discover if other indicator species occur in stream margin habitats in this site.

Careful conservation management of large diameter dead wood such as fallen trunks and stumps (see Kirby, 1992) in the whole woodland landscape near Enniskerry can be recommended to maintain polypore fungi and their associated invertebrate communities. This is especially so as Speight (1980) has pointed out that the management of the Deerpark part of the estate earlier this century has resulted in extinctions of species for which the area was the only known locality in Ireland, and therefore loss of value as an example of an old woodland ecosystem.

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TABLE 1. Staphylinid beetles from Powerscourt Demesne woodland. Nomenclature follows Lucht (1987), Lohse and Lucht (1989), Booth (1988) and Muona (1990) (*Micropeplus* is now placed in the Micropeplidae). Microhabitat abbreviations:- L *M.g.* - Living *Meripilus giganteus*; D *M.g.* - Decomposing *Meripilus giganteus*; L *D.q.* - Living *Daedalea quercina*; Moss - woodland floor moss; Pas - pasture with *Ulex*; Stream - stream margin with *Carex*; Bark - *Pseudotsuga* bark.

Species	Microhabitat						
	L *M.g.*	D *M.g.*	L *D.q.*	Moss	Pas	Stream	Bark
Atheta castanoptera (Mannerheim)	4	1	-	-	-	-	-
Atheta celata (Erichson)	6	1	-	2	-	-	-
Atheta corvina (Thomson)	8	3	-	-	-	-	-
Atheta harwoodi Williams	3	-	-	-	-	-	-
Atheta nigra (Kraatz)	1	-	-	-	-	-	-
Atheta nigricornis (Thomson)	5	-	-	-	-	-	-
Atheta picipes (Thomson)	5	2	-	-	-	-	-
Bolitochara obliqua Erichson	1	-	-	-	-	-	-
Gabrius piliger Mulsant & Rey	1	87	-	-	-	-	-
Megarthrus depressus (Paykull)	1	-	-	-	-	-	-
Megarthrus sinuatocollis (Boisduval & Lacordaire)	1	-	-	-	-	-	-
Proteinus brachypterus (Fabr.)	3	-	-	-	-	-	-
Acrotona aterrima (Gravenhorst)	-	2	-	-	-	-	-
Atheta cinnamoptera (Thomson)	-	1	-	-	-	-	-
Autalia impressa (Olivier)	-	4	-	-	-	-	-
Nehemitropia sordida (Marsham)	-	1	-	-	-	-	-
Philonthus fimetarius (Gravenhorst)	-	4	-	-	-	-	-
Philonthus tenuicornis Mulsant & Rey	-	3	-	-	-	-	-
Quedius fumatus (Stephens)	-	1	-	2	-	1	-
Quedius mesomelinus (Marsham)	-	1	-	-	-	-	-
Stenus impressus Germar	-	1	-	1	6	-	-
Carpelimus rivularis (Motschulsky)	-	-	1	-	-	-	-
Gyrophaena gentilis Erichson	-	-	1	-	-	-	-
Gyrophaena strictula Erichson	-	-	10	-	-	-	-
Aloconota gregaria (Erichson)	-	-	-	4	-	-	-
Amischa analis (Gravenhorst)	-	-	-	2	2	-	-
Amischa decipiens (Sharp)	-	-	-	1	-	-	-
Atheta fungi (Gravenhorst)/ *amplicolllis* (Mulsant & Rey)	-	-	-	64	1	3	-
Atheta setigera (Sharp)	-	-	-	1	-	-	-
Geostiba circellaris (Gravenhorst)	-	-	-	87	-	2	-
Haploglossa villosula (Stephens)	-	-	-	1	-	-	-

	L *M.g.*	D *M.g.*	L *D.q.*	Moss	Pas	Stream	Bark
Mycetoporus longulus Mannerheim	-	-	-	1	-	-	-
Quedius curtipennis Bernhauer	-	-	-	16	-	-	-
Tachinus signatus Gravenhorst	-	-	-	1	-	-	-
Tachyporus dispar (Paykull)	-	-	-	3	3	-	-
Tachyporus hypnorum (Fabr.)	-	-	-	28	6	-	-
Tachyporus obtusus (L.)	-	-	-	2	-	-	-
Amischa nigrofusca (Stephens)	-	-	-	-	1	-	-
Atheta clientula (Erichson)	-	-	-	-	5	-	-
Sepedophilus nigripennis (Stephens)	-	-	-	-	9	-	-
Stenus clavicornis (Scopoli)	-	-	-	-	1	-	-
Stenus fulvicornis Stephens	-	-	-	-	4	-	-
Stenus nanus Stephens	-	-	-	-	1	-	-
Stenus ossium Stephens	-	-	-	-	1	-	-
Tachyporus chrysomelinus (L.)	-	-	-	-	13	-	-
Tachyporus pusillus Gravenhorst	-	-	-	-	3	-	-
Aloconota sulcifrons (Stephens)	-	-	-	-	-	1	-
Lesteva sicula Erichson	-	-	-	-	-	1	-
Liogluta oblongiuscula (Sharp)	-	-	-	-	-	5	-
Micropeplus staphylinoides (Marsham)	-	-	-	-	-	2	-
Mycetoporus lepidus (Gravenhorst)	-	-	-	-	-	1	-
Quedius picipes (Mannerheim)	-	-	-	-	-	2	-
Ocypus olens (Müller)	-	-	-	-	-	1	-
Atrecus affinis (Paykull)	-	-	-	-	-	-	3
Ischnoglossa prolixa (Gravenhorst)	-	-	-	-	-	-	16
Leptusa fumida (Erichson)	-	-	-	-	-	-	1
Quedius plagiatus Mannerheim	-	-	-	-	-	-	2

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AMELETUS INOPINATUS EATON AND OTHER EPHEMEROPTERA FROM GLENVEAGH NATIONAL PARK, CO. DONEGAL, IRELAND

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Introduction

The mayfly *Ameletus inopinatus* Eaton is previously known in Ireland only from mountainous, fast flowing streams in Co. Wicklow (Clabby, 1971; Fahy, 1973; Bowman, 1991; Kelly-Quinn, 1993). It is also known from Britain and mainland Europe (Gledhill, 1959). This paper presents new records of this species from a mountainous, fast flowing stream in Glenveagh National Park, Co. Donegal. Other nymphs recorded from additional sites within the study area are also listed.

Study area

Glenveagh National Park (C0929) lies along the Derryveagh Mountains in the north-west of Co. Donegal. This 9667 hectares of mountain, moorland and woodland is divided by the valley which gives the park its name, Glenveagh. At the base of this valley is Lough Veagh, a long (max. length 5.5km), narrow (max. width 0.7km), deep (max. depth 45m) lake with a catchment area of 35km^2. The catchment area lies between 43 and 650m. O.D. The two principal inflowing streams to the lake, the Owenveagh and the Glenlackburn Rivers which enter at the south-western shore, drain the larger southern portion of the catchment. Several small torrential streams with high gradients drain the smaller, steep, remaining catchment areas. Two of these streams, Sruthnacoille and Derrybeg, were sampled and enter the lake at the western shore. The catchment has natural stocks of brown and sea trout (*Salmo trutta* L.), salmon (*Salmo salar* L.), eel (*Anguilla anguilla* L.) and arctic char (*Salvelinus alpinus* (L.)) (Central Fisheries Board, 1990). The principal rock type in the catchment is granite overlain

with peaty podzols with some lithosols and blanket peat. Although the catchment is uninhabited, Glenveagh Castle and gardens are visited by some 80,000 people annually. The park is owned and maintained by the National Parks and Monuments Service of the Office of Public Works.

Methods

Samples were collected on six occasions between March 1991 and November 1994 as part of the ongoing monitoring study of acid sensitive waters in Ireland being carried out by the Environmental Protection Agency. The macroinvertebrate communities in the four main inflowing streams, Sruthnacoille, Derrybeg, Owenveagh, and Glenlackburn and at one lake shore site, were examined. Physicochemical information on each site is given in Table 1. All lotic samples were obtained from shallow riffle reaches of the influents. Lake samples were obtained from the littoral area along the exposed shoreline north-east of the Glenveagh Castle. All samples obtained were timed qualitative pond net kick samples collected for a total duration of five minutes each, followed by a stone washing. Samples were preserved in formalin. Ephemeropteran nymphs were identified from Elliott *et al.* (1988). Voucher specimens have been lodged in the National Museum of Ireland.

Results

Some thirteen species of Ephemeroptera were recorded as nymphs during the sampling period (Table 2). Representatives of six of the eight families reputedly occurring in Britain and Ireland were present (Elliott *et al.*, 1988). According to Connolly and McCarthy (1993) there are thirty-four species of Ephemeroptera recorded at present from Ireland. Between five and nine species were recorded from each site during the study period with one to six species recorded on each sampling occasion. Species of Baetidae were numerically dominant at all sites on most sampling occasions. The Heptageniidae were also well represented.

Littoral samples from the lake shore were dominated by *Centroptilum luteolum* (Müller) on four out of five occasions. *Caenis luctuosa* (Burmeister) was dominant in October 1993 (Table 3) but both the total numbers of specimens (7) and the number of *C. luctuosa* (3) were low. The latter was only recorded from the lake shore on these sampling occasions although it is known from both lotic and lenthic habitats in other catchments (Connolly and McCarthy, 1993).

Heptagenia sulphurea (Müller) was recorded from the lake shore on all occasions and from Glenlackburn in November 1994.

Lotic sites were mostly dominated by *Baetis rhodani* (L.) or members of the Heptageniidae. At Sruthnacoille, *B. rhodani* was dominant on five out of six occasions with *Ecdyonurus venosus* (Fabricius) dominant in November 1994. *B. rhodani* was dominant at all times at Derrybeg. At Owenveagh, *Rhithrogena semicolorata* (Curtis) was numerically dominant in October 1993 and November 1994 with *Ephemerella ignita* (Poda) dominant in June 1992. *B. rhodani* was dominant on four out of six occasions at Glenlackburn with *R. semicolorata* dominant in October 1993. *Heptagena lateralis* (Curtis) was dominant in April 1994.

A single specimen of *Ameletus inopinatus* Eaton was recorded on two of the five sampling occasions at the Derrybeg site in October 1993 and April 1994. Gledhill (1959) recorded this species as the only "arctic-alpine" member of the order Ephemeroptera occurring in the British Isles. Harris (1952) mentioned it as occuring in high hill streams. However, *A. inopinatus* also occurs in lochs not high above sea level in the extreme north-west of Scotland (Gledhill, 1959). In mainland Europe it is found high in the Vosges Mountains, France, in the Black Forest Mountains in Germany, in both Moravia and the Böhmerwald Mountains in the Czech Republic and the High Tatra Mountains of Slovakia (formerly Czechoslovakia), in Norway (Gledhill, 1959) and also in Sweden (Elliott *et al.*, 1988). Thus *A. inopinatus* is found throughout Europe in mountainous rivers but calling it an arctic-alpine species may be an overstatement. It is found outside these regions in the above countries as illustrated by the aforementioned authors and Illies (1978). Its presence in Ireland is not unusual in mountainous, fast flowing streams and is to be expected. This species may be under recorded due to its superficial resemblance to members of the Baetidae (Elliott *et al.*, 1988) which tend to be more numerous.

In Ireland, this species was recorded previously by Clabby (1971) in the Glencullen River, Co. Wicklow. Fahy (1973) recorded it in low numbers in Glenmalur and Sally Gap, Co. Wicklow during March and April above 300m O.D. along with *B. rhodani* and *R. semicolorata*. Bowman (1991) noted the presence of *A. inopinatus* in the Glenealo River at Glendalough, Co. Wicklow, in April 1989. Other species present at the time were *Baetis* spp., *R. semicolorata* and *Ecdyonurus* sp. Kelly-Quinn (1993) obtained *A. inopinatus* in 1990 and 1992 also in Co. Wicklow where it was the sole ephemeropteran at sites above the 500m

contour. At other sites sampled by her in Wicklow (between 300 and 500m O.D.) it occurred in small numbers with the more numerous *B. rhodani* and *Siphlonurus lacustris* Eaton. In the samples from Co. Donegal, *A. inopinatus* occurred as single specimens with the more numerous *B. rhodani* and *R. semicolorata* in 1993, and *B. rhodani* and *H. lateralis* in 1994 from Derrybeg in Glenveagh National Park.

The second member of the Siphlonuridae recorded, *Siphlonurus lacustris*, occurred at three sites - the lake shore, Derrybeg and Owenveagh. Numbers were sparse at the latter two sites. Other species occurring in relatively low numbers included *Baetis muticus* (L.), *Leptophlebia vespertina* (L.) and *Caenis rivulorum* Eaton.

The majority of the species recorded in this study are widely distributed in Europe. Three species (*R. semicolorata*, *H. lateralis* and *E. venosus*) have a southern/central european distribution and three species, (*L. vespertina*, *C. rivulorum* and *A. inopinatus*) have a northern/central european distribution (Connolly and McCarthy, 1993).

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TABLE 1. Physicochemical parameters at the sites sampled. All chemical data were recorded from the period 1988 - 1989 with each site examined 10 times per annum (Bowman, 1991).

Parameter	**Shore**	**Sruthna-coille**	**Derrybeg**	**Owenveagh**	**Glenlack-burn**
O.S. Grid Reference	C025214	C015216	C003194	B990178	C008191
Altitude (m O.D.)	43	44 - 46	44 - 46	46	46
Flow Regime	-	Moderate - Torrential	Moderate - Torrential	Moderate - Fast	Moderate - Fast
Substrate type	Stones, Sand	Rock, Bedrock	Rock, Bedrock	Stones, Gravel	Rock, Bedrock
Width (m)	-	1	1-2	5	4
Conductivity (uS/cm) range	-	55-345	5-450	55-415	65-380
(median value)	-	(90)	(75)	(80)	(105)
pH range	-	4.60-6.81	4.83-6.77	5.08-6.89	5.76-7.33
(median value)	-	(6.39)	(5.71)	(6.17)	(6.55)
Dissolved Oxygen (% sat)	-	96	100	95	97

TABLE 2. Ephemeroptera recorded from Glenveagh National Park, Co. Donegal, between 1991 and 1994, where presence/absence is indicated by +/-.

Family	Species	Code	Site				
			Lake Shore	Sruthna-coille	Derrybeg	Owen-veagh	Glenlack-burn
Siphlonuridae	*Siphlonurus lacustris* Eaton	1	+	−	+	+	−
	Ameletus inopinatus Eaton	2	−	−	+	−	−
Baetidae	*Baetis rhodani* (Pictet)	3	+	+	+	+	+
	Baetis muticus (L.)	4	−	+	−	+	+
	Centroptilum luteolum (Müller)	5	+	−	−	+	−
Heptageniidae	*Ecdyonurus venosus* (Fabricius)	6	−	+	−	+	−
	Heptagenia sulphurea (Müller)	7	+	−	−	−	+
	Heptagenia lateralis (Curtis)	8	+	+	+	+	+
	Rhithrogena semicolorata (Curtis)	9	−	+	+	+	+
Leptophlebiidae	*Leptophlebia vespertina* (L.)	10	+	+	−	−	−
Ephemerellidae	*Ephemerella ignita* (Poda)	11	−	+	−	+	−
Caenidae	*Caenis rivulorum* Eaton	12	−	−	−	+	−
	Caenis luctuosa (Burmeister)	13	+	−	−	−	−
	Number of species	13	7	7	5	9	5

TABLE 3. Numbers of nymphs recorded on each sampling occasion. Species are number coded as in Table 2.

Site	Date	Code												
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Shore	Mar-91	19	0	1	0	36	0	22	0	0	3	0	0	8
	Dec-91	0	0	0	0	33	0	8	1	0	0	0	0	26
	Jun-92	0	0	0	0	28	0	1	1	0	1	0	0	16
	Oct-93	0	0	0	0	1	0	2	0	0	1	0	0	3
	Apr-94	3	0	0	0	16	0	2	3	0	2	0	0	4
Sruthnacoille	Mar-91	0	0	70	0	0	9	0	6	10	0	0	0	0
	Dec-91	0	0	76	1	0	12	0	0	4	3	0	0	0
	Jun-92	0	0	2	0	0	0	0	1	0	0	1	0	0
	Oct-93	0	0	69	0	0	10	0	0	1	0	0	0	0
	Apr-94	0	0	54	0	0	11	0	4	8	0	0	0	0
	Nov-94	0	0	16	0	0	20	0	0	2	1	0	0	0
Derrybeg	Mar-91	0	0	32	0	0	0	0	0	0	0	0	0	0
	Dec-91	0	0	83	0	0	0	0	0	0	0	0	0	0
	Jun-92	1	0	51	0	0	0	0	0	0	0	0	0	0
	Oct-93	0	1	25	0	0	0	0	0	2	0	0	0	0
	Apr-94	0	1	8	0	0	0	0	2	0	0	0	0	0
Owenveagh	Mar-91	0	0	150	0	0	18	0	0	81	0	0	0	0
	Dec-91	0	0	124	0	0	25	0	0	90	0	0	1	0
	Jun-92	2	0	33	0	0	0	0	2	2	0	103	0	0
	Oct-93	0	0	121	1	0	0	0	0	124	0	0	1	0
	Apr-94	0	0	79	0	3	0	0	5	40	0	0	0	0
	Nov-94	0	0	23	1	0	32	0	0	63	0	0	0	0
Glenlackburn	Mar-91	0	0	177	0	0	0	0	71	36	0	0	0	0
	Dec-91	0	0	91	0	0	0	0	9	44	0	0	0	0
	Jun-92	0	0	73	18	0	0	0	13	5	0	0	0	0
	Oct-93	0	0	21	0	0	0	0	5	38	0	0	0	0
	Apr-94	0	0	27	1	0	0	0	88	14	0	0	0	0
	Nov-94	0	0	16	0	0	0	3	4	8	0	0	0	0

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THE DISTRIBUTION OF GALL-CAUSING CYNIPIDS (HYMENOPTERA) ON OAK (*QUERCUS*) IN IRELAND

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Introduction

This paper reviews the known oak cynipids in Ireland and maps their distribution. Such information will provide base-line data so that future changes in the fauna can be detected. This is especially important for *Andricus quercuscalicis* (Burgsdorf) which can cause serious damage to the acorns of *Quercus robur* L.

Previous work in Ireland

A. H. Haliday (1806-1870) was an expert on the Hymenoptera as well as many other groups of insects in Ireland (O'Connor and Nash, 1982). In his manuscript list of Irish insects preserved in the National Museum of Ireland, he recorded the cynipid species then known from the island. He noted four gall causers on oak (*Quercus*) *viz. Neuroterus longipennis* Fabr. (We have been unable to trace the modern name of *N. longipennis*), *Cynips quercus-radicis* Fabr., (now *Andricus quercusradicis* (Fabr.)), *Spathegaster quercusbaccarum* L. (now *Neuroterus quercusbaccarum* (L.)) and *Teraturgus terminalis* (*quercus ramuli*) (now *Andricus quercusramuli* (L.)). Haliday noted the cottony galls of the latter species from Mount Mellick (Co. Laois) in July 1849. A nominal date of c.1855 has been assigned to his list (Robert Nash, ms).

Modern Irish studies

Little work was subsequently carried on the group here until 1989. In that year, with the

discovery of the invader-species *Andricus lignicola* (Hartig) in Co. Wexford (O'Connor and O'Connor, 1993a), it was decided to investigate the Irish fauna of cynipid gall-formers on oaks and a team (JPOC, MAOC, SW and PA) based in Dublin carried out research on the distribution of the various species (O'Connor and O'Connor, 1993b; O'Connor, O'Connor and Wistow, 1993; O'Connor *et al.*, 1993a, 1993b, 1995a, 1995b). To date, their field work has been concentrated in the Republic.

Four cynipid species, (*A. corruptrix* (Schlechtendal), *Andricus kollari* (Hartig), *A. lignicola* (Hartig) and *A. quercuscalicis* were the subject of various studies concerning biological invasions. All four induce the galls of their agamic generation on native oaks (*Q. petraea* (Mattuschka) Liebl., *Quercus robur*, and/or *Q. petraea* x *Q. robur* (*Q. rosacea* Bechst.) and the galls of the sexual generation on the introduced Turkey oak (*Q. cerris* L.). While the native oaks are relatively common in most parts of Ireland, Turkey oak is much scarcer and can normally only be found in places where it was planted. Since Turkey oak is an obligatory host for the four invading cynipid species, one might expect that their distribution would reflect the distribution of the scarcer host tree. In 1993, a team (KS, MJC, PW) from Imperial College, interested in mapping the invading species, carried out intensive field work from 29 August and 10 September throughout the island (Schönrogge *et al.*, 1994). The described link between Turkey oak and the cynipid species, however, could only be detected for *A. quercuscalicis*, indicating that the dispersal ability of *A. kollari* and *A. lignicola* might reach further than the distances between patches of Turkey oaks in Ireland. *A. corruptrix*, which is thought to be the most recent invading species, was only detected in one site in Dublin during the study and no analysis was possible.

Format of the list

All the collecting sites are listed in Table 1. Four-figure grid references are included whenever possible. Each site has been assigned an unique number and under each species, sites are listed using these numbers. In addition, the distribution in 10km squares is shown (Figs 1-30). The maps have been generated using a special computer programme at Silwood. In a few instances, adjoining squares are shown slightly separated due to software problems. Following Macan (1970), the terms common (rare) and abundant (scarce) are used in the list. These are

defined as follows:- common (rare) means present in many (few) places and abundant (scarce) present in large (small) numbers. They are based on qualitative observations made by the authors.

TABLE 1. List of collecting sites and grid references.

ANTRIM

1: The Castle, Lough Neagh (J1487).

ARMAGH

1: Ardress, near Portadown (H9156); 2: Peatlands Country Park (H9163).

CARLOW

1: Altamont Gardens (S8665); 2: Bahana Woods, near St. Mullins (S7239); 3: St. Mullins (S7238).

CAVAN

1: Dún an Rí Forest Park, near Kingscourt (N8096); 2: Killykeen Forest Park (H3406); 3: Killykeen road to Cavan, near Farnham House (H3806); 4: Virginia (N5987).

CLARE

1: Ballyeighter Loughs (R3493).

CORK

1: Annes Grove, near Castletownroche (R6804); 2a: west of Bandon (W3955); 2b: ditto (W4855); 3: Bantry Hotel (W0048); 4: Carrigaline (W7362); 5: Clashnacrona Forest (W1949); 6: near Dernagree (Dromagh Castle area) (W3498); 7: west of Drimoleague (W0846); 8: Fota (W7972); 9a: Glengarriff (V9156); 9b: ditto (V9256); 9c: ditto (V9258); 9d: ditto (V9357); 10: near Inishannon (W5557); 11: Little Island (W7772); 12a: north west side of Lough Hyne (W0828); 12b: west side of Lough Hyne (W0827); 13a: near Mallow (W4997); 13b: near Mallow (W9198); 14: near Midleton (W9174).

DERRY

1: Ballykelly Forest Park (C6223); 2: Brook Hill (C4520); 3: Coleraine Campus (C8435); 4: Limavady (C6824); 5: near Limavady (C5-2-); 6: near Spring Hill (H8682).

DONEGAL

1: Ardnamona (G9684); 2: Ards Forest near Dunfanaghy (C0533); 3: Churc Hill, near Lough Gartan (C0617); 4: Colmcille Heritage Centre near Churc Hill (C0616); 5: Donegal Town (G9277); 6: near Donegal (G9377); 7: Glenveagh (C0218); 8a: Lough Eske (G9883); 8b: north-west corner of Lough Eske (G9685); 8c: south end of Lough Eske (G9581); 9: New Bridge, Owencarrow River (C0727); 10: near Rathmelton (C2121); 11: near Stranorlar (H1696).

DOWN

1: Castleward, Strangford (J5749); 2: Castlewellan Forest Park (J3237); 3: Dundrum (J4036); 4: Mount Stewart, near Newtownards (J5570); 5: east of Newry (J1027); 6: Rowallane (J4257); 7: Stranmillis College, Belfast (J3371); 8: Tollymore Forest Park (J3532).

DUBLIN

1: Ballybrack (O2424); 2: Castleknock (O0837); 3: Clontarf (O2137); 4: Dean's Grange (O2227); 5: Dublin (O1-3-); 6: Killiney Hill (O2625); 7: Mount Anvil (O1828); 8: National Botanic Gardens (O1537); 9a: Phoenix Park (O1135); 9b: Ashtown Castle, Phoenix Park (O1136); 9c: Castleknock Gate, Phoenix Park (O1036); 9d: near Ordance Survey, Phoenix Park (O1035); 9e: Phoenix Monument, Phoenix Park (O1135); 9f: near Zoological Gardens, Phoenix Park (O1235); 10: Rockbrook Park School (O1226); 11: Tallaght (O0927); 12: University College, Belfield (O1830); 13: Wyattville Road, Ballybrack (O2424).

GALWAY

1: Clarinbridge (M4120); 2: near Cong (M1454); 3: Coole Park, Gort (M4304); 4: near Mount Bellew (M6747); 5: near Newbridge (M7453).

KERRY

1: near Anascaul, Dingle Peninsula (Q5601); 2: Barry's Glen near Killarney (V9597); 3: Belmont near Tralee (Q8313); 4: Blue Pool, Killarney National Park (V9886); 5: Cloghereen, Killarney National Park (V9886); 6: near Dernagree (W2797); 7: Derrycunihy (V9281); 8: Doo Lough, Killarney National Park (V9586); 9: near Dromagorteen Bridge (V9565); 10: near Fieries (Q8903); 11: Hotel Europe, Killarney (V9191); 12: Kenmare (V9071); 13: Knockreer Estate, Killarney National Park (V9591); 14: Lady's View, Killarney National Park (V9080); 15: Mangerton Road, Killarney (V9886); 16a: Muckross, Killarney National Park (V9686);

16b: also (V9786); 17: Muckross Abbey, Killarney National Park (V9787); 18: New Flesk Bridge, Killarney (V9689); 19: Ross Island, Killarney National Park (V9488); 20: Torc, Killarney National Park (V9584); 21: Upper Lake, Killarney National Park (V9282); 22: near Woodford (W0189).

KILDARE

1: near the Castle, Monasterevin (N6511); 2: Donadea (N8332); 3: near Eadestown (N9517); 4: Moyvalley (N7242); 5: Naas (N8719).

KILKENNY

1: Airport Road near Kilkenny City (S4756); 2: Brownsbarn Bridge, River Nore (S6139); 3: Kilkenny Castle (S5155); 4: near Threecastles House (S4761).

LAOIS

1: Ballinakill (S4680); 2: Emo Court (N5407); 3: near Pallas (N4500); 4: near Portarlington (N5615).

LEITRIM

1: near Dromahair (G8032); 2: Drumshanbo (G9710); 3: Killegar (H2606); 4: Leitrim Town (G9504); 5: Lough Rynn House (N1294); 6: Mohill (N0896); 7: near Mohill (N0696).

LIMERICK

1: Adare Manor (R4645); 2: near Castleconnell (R6662); 3: Plassey (R6157).

LONGFORD

1: near Longford (N1475).

LOUTH

1: Collon (N9982); 2: near Oriel Temple, Collon (O0283).

MAYO

1: Drummin, west of Foxford (G2404); 2: Erriff Woods (L9668); 3: near Pontoon (G1804); 4: Westport House (L9984); 5: Westport Town (L9984).

MEATH

1: east of Athboy (N7567); 2: Dunsany Castle (N9155); 3: Oldbridge, River Boyne (O0475); 4: Swainstown (N9057).

OFFALY

1: Birr Castle (N0505); 2: Charleville, Tullamore (N3224); 3: west of Cushina (N5416).

ROSCOMMON

1: south end of Lough Allen near Arigna (G9513); 2a: Lough Key Forest Park (G8403); 2b: ditto (G8504); 3: Yew Point (N0148).

SLIGO

1: near Grange (G6547); 2: Lahanagh, Lough Gill (G7232); 3: Lissadell House (G6244); 4: near Mullaghmore (G7055); 5: Sligo (G6936); 6: near Sligo Cathedral (G7035); 7: Slish Wood (G7432).

TIPPERARY

1a: Ballina (R7072); 1b: Belleek Castle Hotel, Ballina (R7072); 2: Ballynakill (M9505); 3a: Swiss Cottage, Caher (S0522); 3b: ditto (S0525); 4: Glenleigh in Clogheen (S0014); 5: Mullinahone (S3840).

TYRONE

1: Parkanaur Forest Park (H7463).

WATERFORD

1: east of Ballyduff (S5209); 2: Lismore Castle (X0598); 3: Old Court Hotel (S5410); 4: near Old Court Hotel (S5610); 5: near Passage East (S6811); 6: Tallowbridge (W9994); 7a: near Tallowbridge (W9894); 7b: ditto (W9996); 8: Tikincor Wood (S2421); 9: near Waterford City (S5811).

WESTMEATH

1: near Athboy (N6464); 2: Belvidere Estate (N4247); 3: south-east of Castlepollard (N4769); 4: Coosan Point near Athlone (N0445); 5: Crookedwood (N4761); 6: near Devlin (N5964); 7: near Rochfortbridge (N4544); 8: Tullynally castle near Castlepollard (N4571).

WEXFORD

1: near Ballynabola (S8125); 2: near Ballyprecas (S9155); 3: near Blacker's Bridge (S8644); 4: near Bunclody (S9357); 5: Coolbawn (S8237); 6: Courtown Woods (T2057); 7a: Ferrycarrig (T0123); 7b: National Heritage Park, Ferrycarrig (T0023); 8a: Johnstown Castle (T0216); 8b; ditto (T0317); 9a: J. F. Kennedy Park (S7319); 9B: ditto (S7420); 10: Killoughrum Forest (S9041); 11a: New Ross (S7126); 11b: ditto (S7228); 12: Oaklands, near New Ross (S7125).

WICKLOW

1: Aughrim (T1479); 2a: Avondale (T1986); 2b: ditto (T2088); 3: near Ballard (T2687); 4:

north of Baltinglass (S9094); 5: Blessington (N9815); 6a: Bray Head (O2816); 6b: ditto (O2817); 7: Broad Lough, Tinakelly (T3096); 8: Castlekevin near Annamoe (T1797); 9: Clonmannan Retirement Home, Broadlough (T3098); 10: Devil's Glen (T2398); 11: Djouce Wood (O2011); 12: Glenart Castle (T2074); 13a: Glendalough, green road (T0996); 13b: ditto (T1096); 13b: ditto, Upper Lake (T1196); 13d: ditto (T1296); 14: Glending (N9714); 15: Glenealy Wood (T2592); 16: Glenmalur (T0692); 17: Killiskey (O2600); 18: Kilruddery Estate, Bray (O2616); 19: Kindelstown Wood (O2811); 20: Knocksink Wood (O2217); 21: Lough Tay (O1606); 22: Mount Usher (T2896); 23: Nun's Cross (T2698); 24: Oldbridge near Roundwood (O1601); 25: Pollaphuca House near Blessington (N9407); 26: Powerscourt (O2116); 27: Powerscourt Waterfall (Deerpark) (O2012); 28: near Rathdrum (T1990); 29: Tomnafinnoge Wood (T0369); 30: Trooperstown Wood (T1596); 31: Vale of Clara (T1792).

Distribution in Ireland

***Andricus albopunctatus* (Schlechtendal) (Fig. 1)**

CAVAN: 1; KERRY: 2; SLIGO: 2.

As its galls can be difficult to find, this species is probably more common than the above records would indicate.

***Andricus anthracina* (Curtis) (Fig. 2)**

ANTRIM: 1; ARMAGH: 2; CARLOW: 1; CAVAN: 2, 3, 4; CORK: 1, 2a, 2b, 6, 8, 9b, 9c, 12a; DERRY: 1, 2, 3, 4, 5; DONEGAL: 1, 7, 8b, 8c, 10, 11; DOWN: 1, 2, 3, 5, 6, 7; DUBLIN: 8, 9a, 9c, 11; GALWAY: 1, 2, 3, 5; KERRY: 2, 4, 9, 14, 16a, 16b, 19, 22; KILDARE: 1, 2, 3; KILKENNY: 3, 4; LAOIS: 2, 4; LEITRIM: 1, 3, 5, 7; LIMERICK: 1; LONGFORD: 1; LOUTH: 2; MAYO: 1, 2, 3; MEATH: 1, 2, 3; OFFALY: 2; ROSCOMMON: 1, 2a, 3; SLIGO: 2, 3, 4, 7; TIPPERARY: 1a, 1b, 3b, 4; TYRONE: 1; WESTMEATH: 1, 2, 3, 4, 6, 7; WEXFORD: 5, 7a, 8b, 9b, 11a; WICKLOW: 2a, 2b, 10, 11, 12; 13c, 13d, 14, 15, 16, 20, 22, 25, 26, 27, 28, 31.

A common and abundant species.

***Andricus callidoma* (Hartig) (Fig. 3)**

KERRY: 4.

A rare and scarce species.

***Andricus corruptrix* (Schlechtendal) (Fig. 4)**

DUBLIN: 9c; KERRY: 13.

One of the alien invading species, it is still extremely rare and scarce.

***Andricus curvator* Hartig (Fig. 5)**

ANTRIM: 1; ARMAGH: 1; CARLOW: 1; CAVAN: 4; CORK: 4, 9b; DERRY: 2, 3, 4, 6; DONEGAL: 2, 3, 4, 5, 7, 8b; DOWN: 1, 4, 6, 7, 8; DUBLIN: 4, 6, 8, 9a, 9c, 9e, 10, 11; GALWAY: 2, 3, 4, 5; KERRY: 1, 3, 4, 8; 11, 13, 14, 15, 16a, 16b, 17, 19, 20, 22; KILDARE: 1, 2, 3, 5; KILKENNY: 3; LEITRIM: 3, 5, 6; LIMERICK: 1, 2, 3; LONGFORD: 1; LOUTH: 1; MAYO: 1, 2, 4, 5; MEATH: 1, 4; OFFALY: 1, 2, 3; ROSCOMMON: 1, 2b, 3; SLIGO: 2, 3, 6; WESTMEATH: 1, 6, 7; WEXFORD: 8b, 9b; WICKLOW: 2a, 2b, 13d, 18, 22, 26, 27, 29.

A common and abundant species.

***Andricus fecundator* (Hartig) (Fig. 6)**

ANTRIM: 1; CARLOW: 1; CAVAN: 2, 3, 4; CORK: 1, 2b, 3, 5, 7, 8, 9b, 9c, 9d, 14; DERRY: 1, 2, 6; DONEGAL: 1, 2, 6, 7, 8a, 9; DOWN: 1, 2, 4, 5, 6, 7; DUBLIN: 9a, 9c, 9f; GALWAY: 1, 4, 5; KERRY: 4, 7, 8, 11, 12, 14, 15, 16a, 16b, 17, 19, 20, 21, 22; KILDARE: 2; KILKENNY: 3, 4; LAOIS: 2; LEITRIM: 1, 3; LIMERICK: 1; MAYO: 1, 2, 3, 4, 5; MEATH: 3; OFFALY: 2, 3; ROSCOMMON: 2, 3a; SLIGO: 3; TIPPERARY: 1a, 5; TYRONE: 1; WATERFORD: 4, 6, 8; WESTMEATH: 1, 3; WEXFORD: 1, 2, 3, 8b, 9b; WICKLOW: 1, 2a, 2b, 7, 8, 9, 10, 12, 13c, 15, 16, 17, 22, 27, 28, 30, 31.

A common and abundant species. It occurred as artichoke galls on *Quercus dentata* Thunberg (the Daimyo oak) at the J. F. Kennedy Park, Co. Wexford. Marble galls (*Andricus kollari* (Hartig)) and silk buttons (*Neuroterus numismalis* (Geoffroy in Fourcroy)) were also present. Welch (1993) has recorded *N. numismalis* on *Q. dentata* in Britain. The Daimyo oak has large leaves like the giant form of *Q. robur*. A native of China, Korea and Japan, it is an infrequent species in the British Isles (Mitchell, 1988). A modern creation, the Kennedy arboretum was laid out in the 1960s with trees arranged, in the scientific manner, in plots (Heron, 1993) and the Daimyo oaks have been planted there only within the last thirty years.

***Andricus glandulae* (Hartig) (Fig. 7)**

CORK: 9a; KERRY: 4.

A rare and scarce species.

***Andricus inflator* Hartig (Fig. 8)**

CAVAN: 4; DUBLIN: 9c; KERRY: 16b; KILDARE: 1, 2; LIMERICK: 1; MAYO: 4; OFFALY: 1, 2; WEXFORD: 1, 8b, 9b.

Although widely distributed, this species is rare and scarce.

***Andricus kollari* (Hartig) (Fig. 9)**

ANTRIM: 1; ARMAGH: 2: CARLOW: 1, 2; CAVAN: 4; CORK: 1, 2a, 3, 4, 6, 7, 8, 11, 13a, 14; DERRY: 2, 3, 4, 6; DONEGAL: 3, 6, 8b, 8c; DOWN: 1, 2, 4, 5, 6, 7, 8; DUBLIN: 4, 6, 7, 8, 9a, 9c, 9d, 10, 12; KERRY: 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16a, 16b, 17, 19, 20, 21; KILDARE: 1, 2, 3, 4, 5; KILKENNY: 1, 3, 4; LAOIS: 3; LEITRIM: 1, 5; LIMERICK: 1, 2, 3; LONGFORD: 1; LOUTH: 2; MAYO: 1, 2, 4; MEATH: 1, 4; OFFALY: 1, 2; SLIGO: 1, 3, 4; TIPPERARY: 1a, 1b, 4, 5; WATERFORD: 1, 3, 6, 7a, 7b, 8, 9; WESTMEATH: 1, 2, 5, 6, 7; WEXFORD: 1, 5, 6, 7b, 8a, 8b, 9a, 9b, 11b; WICKLOW: 1, 2a, 2b, 5, 7, 8, 9, 11, 12, 13c, 13d, 14, 16, 17, 18, 20, 21, 22, 24, 26, 27, 29, 30.

Marble galls occurred on *Q. dentata* at the J. F. Kennedy Park, Co. Wexford. Because of the tannic acid content of the galls, *A. kollari* was successfully introduced to Devon, England, in the 1830's and by 1860 had spread as far as northern Scotland (Redfern and Askew, 1992). It is interesting to note therefore that *A. kollari* is not mentioned in Haliday's list of c.1855 and that to-date, the earliest known Irish marble galls (in the National Museum of Ireland) date from 31 November 1922. They were collected by Eugene O'Mahony at Heronstown, Co. Dublin and adults emerged in the Autumn of 1923. The species was only recently recorded from Ireland (O'Connor *et. al.*, 1990) although it is common and abundant.

***Andricus legitimus* Wiebes-Rijks (Fig. 10)**

KERRY: 2, 4, 8; WICKLOW: 18, 27.

A rare and scarce species.

***Andricus lignicola* (Hartig) (Fig. 11)**

ANTRIM: 1; ARMAGH: 2; CARLOW: 1, 2, 3; CAVAN: 1, 2, 4; CORK: 1, 2a, 8; DERRY: 3, 4, 6; DONEGAL: 6; DOWN: 1, 2, 4, 6, 7, 8; DUBLIN: 6, 8, 9a, 9b, 9c, 9d, 10, 12; GALWAY: 2; KERRY: 1, 2, 3, 4, 8, 11, 12, 13, 16a, 16b, 19, 22; KILDARE: 2; KILKENNY: 2, 3, 4; LAOIS: 1; LEITRIM: 3, 5; LIMERICK: 1, 2; LONGFORD: 1;

LOUTH: 2; MAYO: 2; MEATH: 1, 4; OFFALY: 1, 2; ROSCOMMON: 2, 3a; SLIGO: 2, 6; TIPPERARY: 1a, 3a, 3b; TYRONE: 1; WATERFORD: 1, 3, 6, 8; WESTMEATH: 1, 2, 4, 5, 6, 7; WEXFORD: 1, 2, 3, 4, 5, 6, 7a, 8b, 9b, 10, 11b, 12; WICKLOW: 1, 2a, 2b, 3, 4, 5, 6a, 7, 8, 9, 10, 12, 13c, 13d, 14, 15, 16, 17, 18, 19, 21, 22, 24, 26, 27, 28, 29, 30, 31.

One of the invading species, it is common and abundant.

***Andricus nudus* Adler (Fig. 12)**

DUBLIN: 2.

A rare and scarce species.

***Andricus solitarius* (Fonscolombe) (Fig. 13)**

DERRY: 6; KERRY: 2, 18; WEXFORD: 12.

A rare and scarce species.

***Andricus quadrilineatus* Hartig (Fig. 14)**

CORK: 9b; KERRY: 3, 4, 8.

A rare and scarce species, to-date only found in the south-west. Undoubtedly it is more widespread than the present records would indicate.

***Andricus quercuscalicis* (Burgsdorf) (Fig. 15)**

CORK: 8, 9a, 10; DOWN: 4, 7, 8; DUBLIN: 7, 8, 9c; KERRY: 3, 12, 16a, 21; KILKENNY: 3; OFFALY: 1; TIPPERARY: 3b, 4; WATERFORD: 2, 8; WESTMEATH: 7; WEXFORD: 7b, 8b, 9b; WICKLOW: 2a, 22.

An invading species, it is now abundant in many parts of Ireland.

***Andricus quercuscorticis* (L.) (Fig. 16)**

CAVAN: 1; CORK: 9b; DUBLIN: 6; KERRY: 2, 3, 4, 8, 11, 13, 16a, 17, 21; KILDARE: 2; LEITRIM: 1, 3; WEXFORD: 10; WICKLOW: 29.

A common and sometimes abundant species.

***Andricus quercusradicis* (Fabr.) (Fig. 17)**

CAVAN: 1, 3, 4; CORK: 10; DONEGAL: 2; DUBLIN: 3, 6, 7, 9c; KERRY: 3, 4, 8, 11, 15, 21, 22; KILDARE: 2; LIMERICK: 3; MAYO: 1, 2; TIPPERARY: 1b; WESTMEATH: 1; WICKLOW: 6b, 13a, 13b, 16, 18, 27, 29.

A common and sometimes abundant species.

***Andricus quercusramuli* (L.) (Fig. 18)**

DUBLIN 8; LAOIS: 4; MEATH: 4.

A rare but sometimes abundant species. There are very few records despite the conspicuous appearance of the gall. The Haliday record "Mt Mellick", probably refers to Mountmellick, Co. Laois (N4507) and it has been entered on the map as such.

***Biorhiza pallida* (Olivier) (Fig. 19)**

ANTRIM: 1; DOWN: 5, 7; DUBLIN: 8, 9a, 9c; OFFALY: 2; WESTMEATH: 7.

A rare but sometimes abundant species, not yet found in the southern half of the island.

***Cynips agama* Hartig (Fig. 20)**

CAVAN: 2, 4; DONEGAL: 10; GALWAY: 1; KILDARE: 2; KILKENNY: 4; LAOIS: 2; LEITRIM: 3; WESTMEATH: 1; WEXFORD: 8a, 12; WICKLOW: 2b, 13c, 14.

A common and often abundant species which has not yet been found in the south-west.

***Cynips disticha* Hartig (Fig. 21)**

CARLOW: 1; CAVAN: 2, 4; CORK: 9b; KERRY: 4, 5; LEITRIM: 3; MAYO: 2; WEXFORD: 5, 7a, 10, 11b, 12; WICKLOW: 2b, 10, 12, 13c, 16, 27, 28, 31.

A common and abundant species which has not yet been found in north.

***Cynips divisa* Hartig (Fig. 22)**

ANTRIM: 1; ARMAGH: 2; CARLOW: 1; CAVAN: 2, 4; CORK: 1, 2b, 5, 9c, 9d, 13a; DERRY: 1, 3, 4, 6; DONEGAL: 1, 8b, 10, 11; DOWN: 4, 6, 7; GALWAY: 1, 3, 4, 5; KERRY: 5, 9, 12, 16a; KILDARE: 2, 3; KILKENNY: 3, 4; LAOIS: 2; LEITRIM: 5; LIMERICK: 1; LONGFORD: 1; LOUTH: 1; MEATH: 3; OFFALY: 1, 2; ROSCOMMON: 3a, 3b; SLIGO: 5; TIPPERARY: 3b; TYRONE: 1; WESTMEATH: 1, 2, 4, 5, 6, 7; WEXFORD: 5, 8b, 9b, 11b, 12; WICKLOW: 1, 2a, 2b, 10, 13c, 14, 15, 16, 26, 31.

A common and abundant species.

***Cynips longiventris* Hartig (Fig. 23)**

CARLOW: 2; CAVAN: 1, 2, 4; CORK: 1; DERRY: 3; DUBLIN: 6, 9a, 9b; GALWAY: 3; KERRY: 14; KILDARE: 2; LAOIS: 2; LEITRIM: 3, 5; LIMERICK: 3; LONGFORD: 1; MEATH: 2, 3; ROSCOMMON: 3b; TYRONE: 1; WEXFORD: 9b, 10, 12; WICKLOW: 1, 2a, 2b, 10, 15, 16, 28, 31.

A common and often abundant species.

***Cynips quercusfolii* L. (Fig. 24)**

CARLOW: 1; CAVAN: 4; CORK: 5, 7, 9b, 9c, 9d; DERRY: 1; DONEGAL: 1; DOWN: 1; DUBLIN: 5; KERRY: 4, 5, 12, 13, 14, 16a, 22; KILDARE: 2; LAOIS: 2; LEITRIM: 5; SLIGO: 3; WEXFORD: 9b, 11b; WICKLOW: 1, 2a, 2b, 12, 15, 24, 27, 28, 31.

A common and often abundant species.

***Neuroterus albipes* (Schenck) (Fig. 25)**

CAVAN: 2, 4; CORK: 1, 2a, 2b, 7; DOWN: 6, 7; DUBLIN: 6, 9c; KERRY: 2, 5; KILDARE: 1, 2; KILKENNY: 3; LAOIS: 2; LEITRIM: 1, 2; LOUTH: 2; MEATH: 2, 3; ROSCOMMON: 4; SLIGO: 4; TIPPERARY: 1b; WATERFORD: 6; WESTMEATH: 2; WEXFORD: 9b, 11a; WICKLOW: 2a, 10, 13c, 14, 16, 18, 20, 25.

A common and often abundant species.

***Neuroterus aprilinus* (Giraud) (Fig. 26)**

CARLOW: 1, 2; CORK: 9a, 9b; DUBLIN: 9b, 9d; KERRY: 4, 16a, 16b, 19, 20; MAYO: 2; WATERFORD: 3; WEXFORD: 11b.

Undoubtedly a common and abundant species which has been underrecorded.

***Neuroterus numismalis* (Geoffroy in Fourcroy) (Fig. 27)**

ANTRIM: 1; ARMAGH: 1, 2; CAVAN: 3, 4; CORK: 1, 2b, 8, 9a, 9b, 9c, 10a; DERRY: 2, 3, 4, 6; DONEGAL: 1, 6, 8b, 10; DOWN: 1, 5, 6, 7; DUBLIN: 1, 2, 7, 9c, 10, 11; GALWAY: 3, 5; KERRY: 2, 14; KILDARE: 2; KILKENNY: 3, 4; LAOIS: 2, 3; LEITRIM: 1, 2, 3, 4, 5; LIMERICK: 1; LOUTH: 1, 2; MEATH: 1, 2, 3; OFFALY: 1, 2; ROSCOMMON: 1, 3b, 4; SLIGO: 3; TIPPERARY: 1b, 5; WATERFORD: 7b; WESTMEATH: 1, 2, 5, 6, 7; WEXFORD: 7b, 8b, 9b, 10, 12; WICKLOW: 1, 2a, 2b, 5, 13c, 13d, 14, 18, 23, 26, 28.

A common and abundant species. It occurred as silk buttons on *Q. dentata* at the J. F. Kennedy Park, Co. Wexford.

***Neuroterus tricolor* (Hartig) (Fig. 28)**

GALWAY: 2; KILDARE: 2; MAYO: 3; WICKLOW: 16, 20.

A rare and scarce species which has also been recorded from Waterford and Killarney (Co. Kerry) by Morley (1931).

***Neuroterus quercusbaccarum* (L.) (Fig. 29)**

ANTRIM: 1; ARMAGH: 1, 2; CARLOW: 1; CAVAN: 2, 3, 4; CLARE: 1; CORK: 1, 2a, 2b, 3, 5, 6, 8, 9b, 9c, 9d, 12b, 13a, 13b, 14; DERRY: 1, 2, 3, 4, 5, 6; DONEGAL: 1, 2, 3, 4, 6, 7, 8a, 8b, 8c, 10, 11; DOWN: 1, 2, 3, 4, 5, 6, 7, 8; DUBLIN: 1, 6, 8, 9a, 9c, 9d, 10, 11, 13; GALWAY: 3, 5; KERRY: 1, 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 16b, 18, 19, 20, 21, 22; KILDARE: 1, 2, 3, 5; KILKENNY: 3; LAOIS: 1, 2, 3, 4; LEITRIM: 1, 2, 3, 4, 5, 6; LONGFORD: 1; LOUTH: 1, 2; MAYO: 1, 2, 3; MEATH: 1, 2, 3; OFFALY: 1, 2; ROSCOMMON: 1, 3a, 3b, 4; SLIGO: 3, 7; TIPPERARY: 1a, 1b, 2, 3b, 4, 5; TYRONE: 1; WATERFORD: 1, 4, 6, 7a, 8; WESTMEATH: 1, 2, 4, 5, 6, 7; WEXFORD: 1, 4, 7a, 7b, 8b, 9b, 10, 12; WICKLOW: 1, 2a, 2b, 5, 7, 10, 11, 13c, 13d, 16, 18, 20, 21, 22, 26, 27, 28, 30, 31.

A common and abundant species.

***Trigonaspis megaptera* (Panzer) (Fig. 30)**

CAVAN: 4; DUBLIN: 7; KERRY: 3, 11, 13, 17; KILKENNY: 4; MAYO: 2; WATERFORD: 5; WEXFORD: 10; WICKLOW: 27.

A rare and scarce species.

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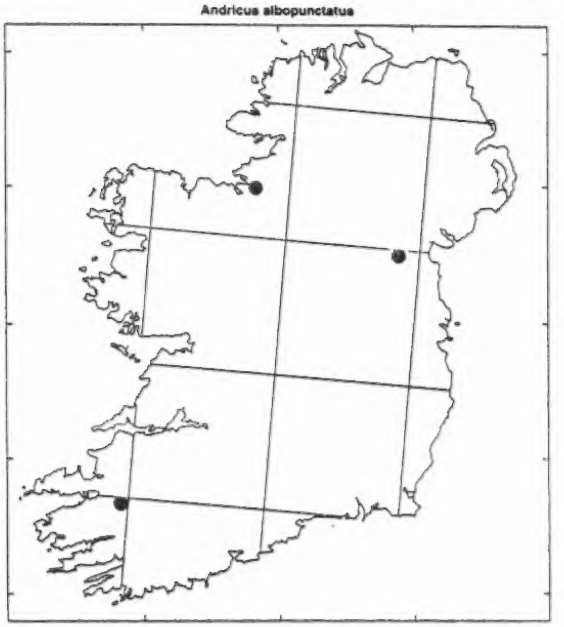
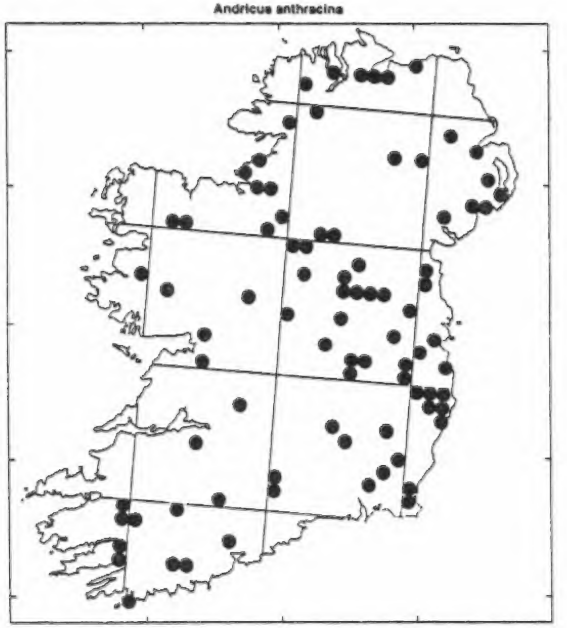
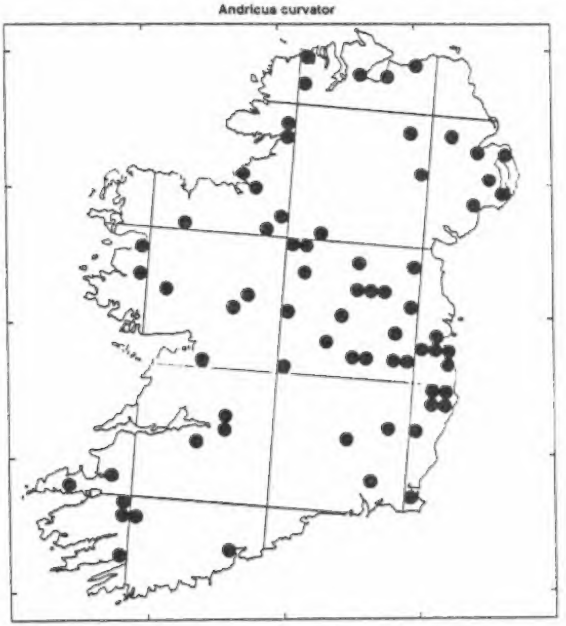
FIGURES 1-2: distribution maps of *Andricus albopunctatus* and *A. anthracina*.

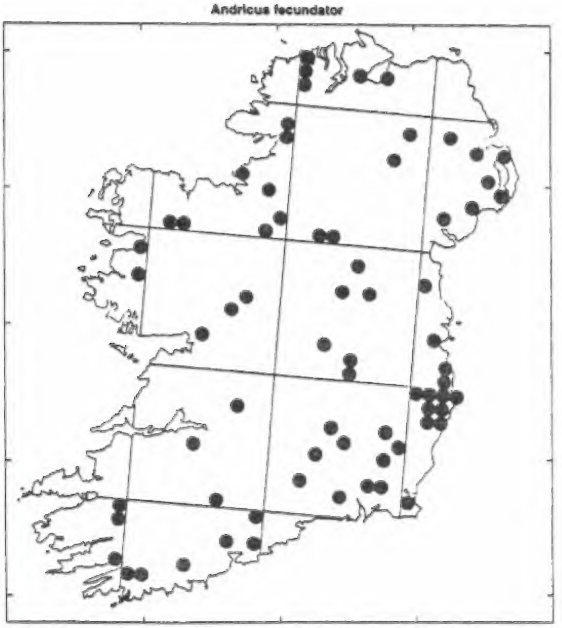




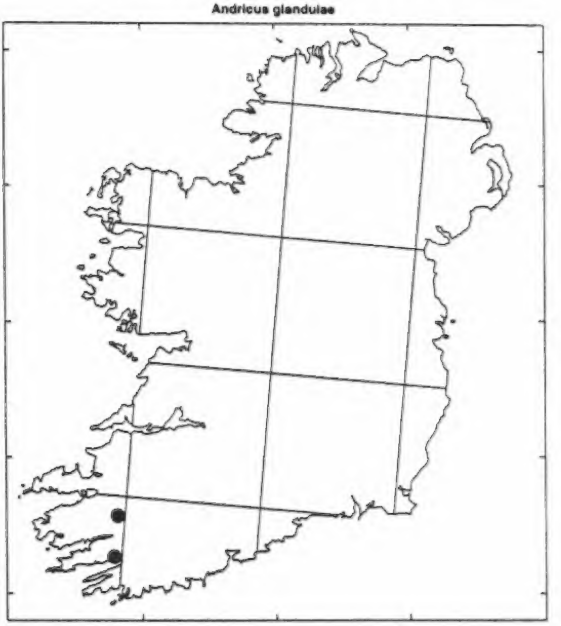
FIGURES 3-4: distribution maps of *Andricus callidoma* and *A. corruptrix*.

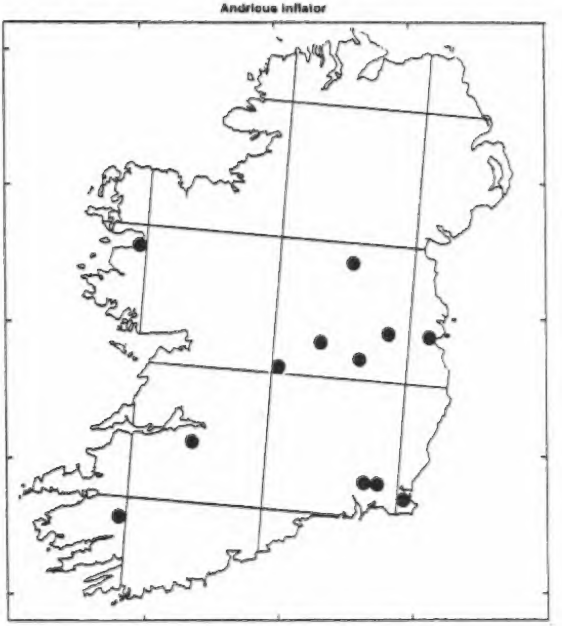
FIGURES 5-6: distribution maps of *Andricus curvator* and *A. fecundator*.



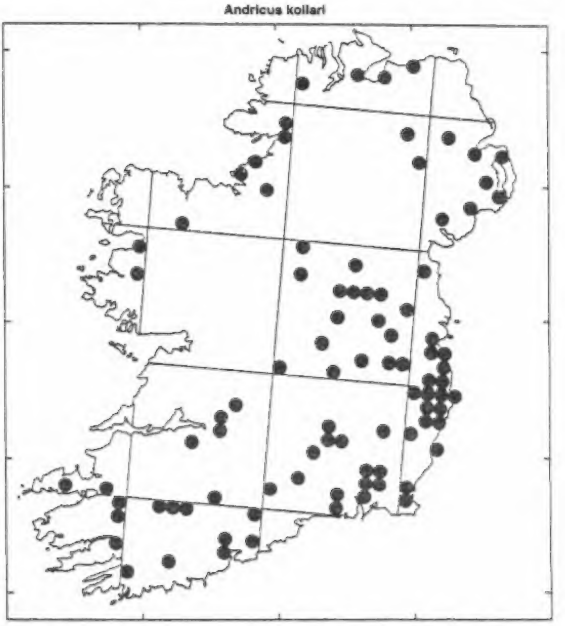


FIGURES 7-8: distribution maps of *Andricus glandulae* and *A. inflator*.

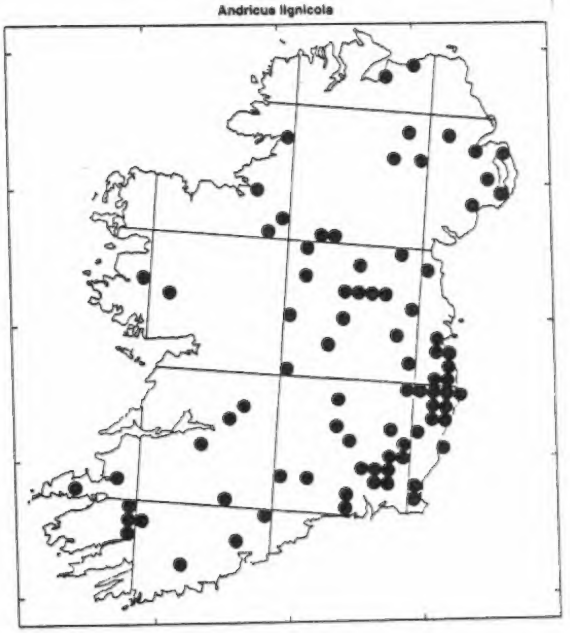




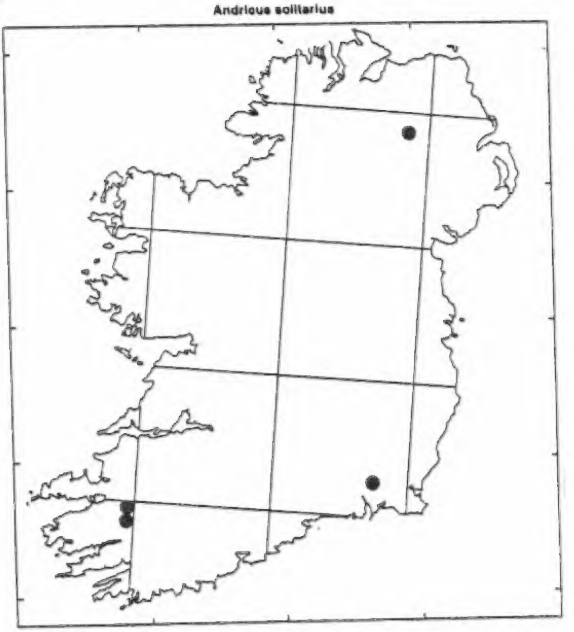
FIGURES 9-10: distribution maps of *Andricus kollari* and *A. legitimus*.

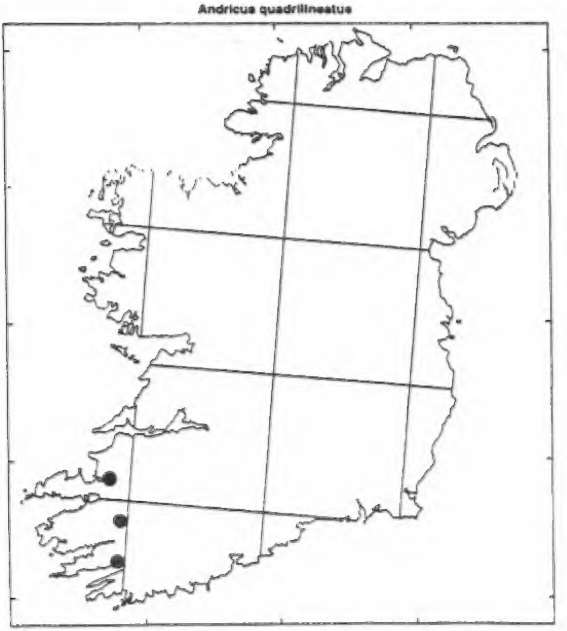


FIGURES 11-12: distribution maps of *Andricus lignicola* and *A. nudus*.

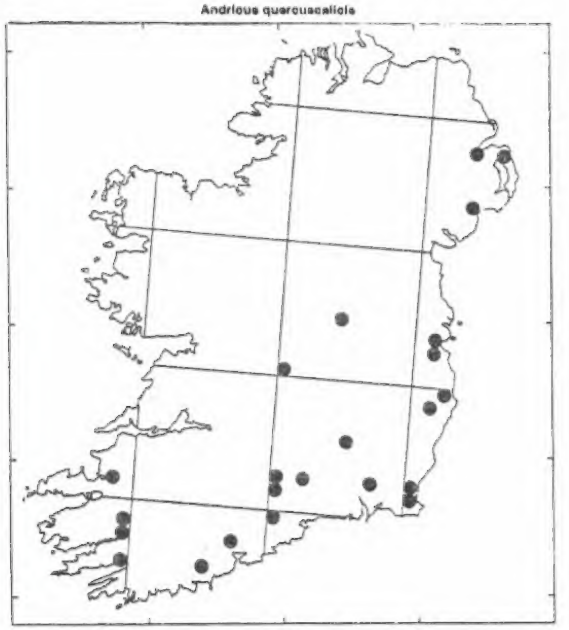


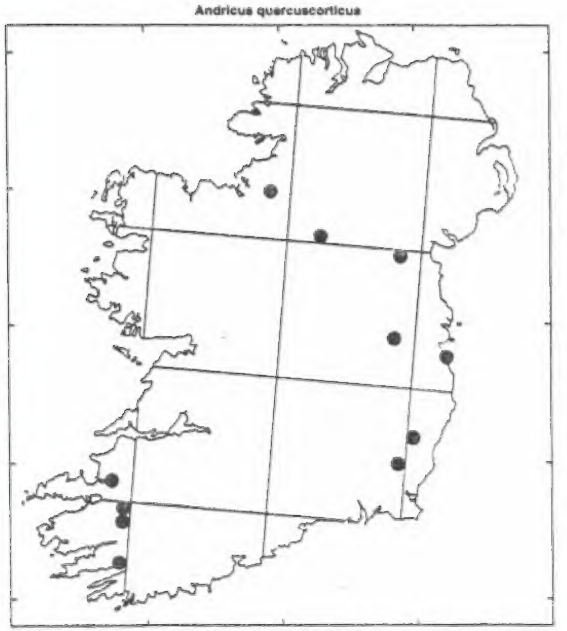
FIGURES 13-14: distribution maps of *Andricus solitarius* and *A. quadrilineatus*.



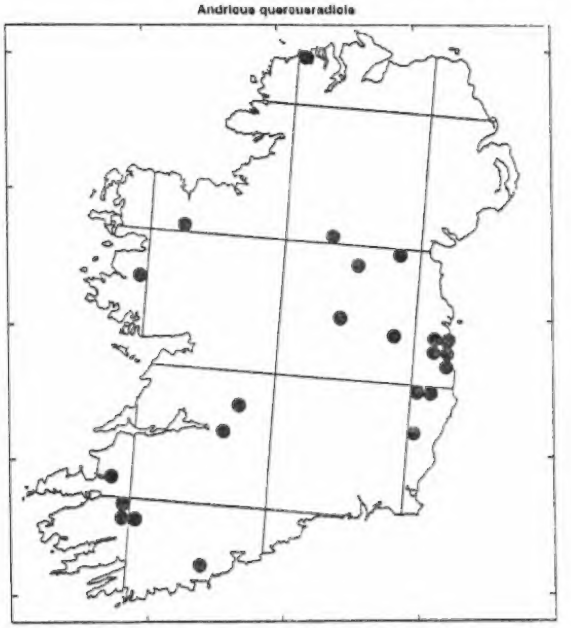


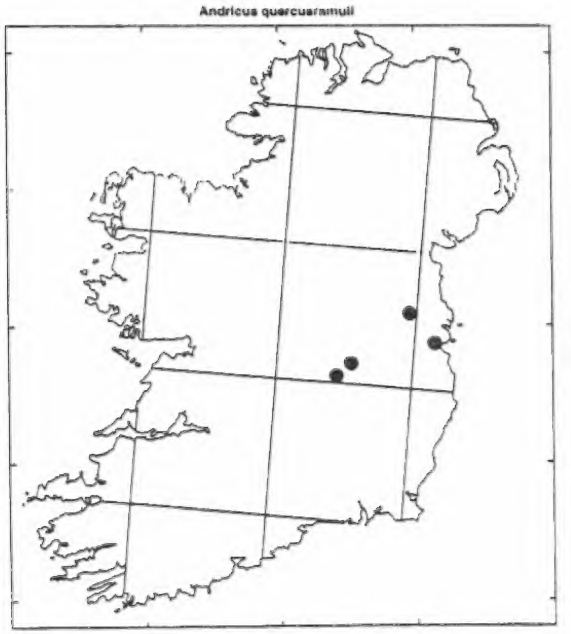
FIGURES 15-16: distribution maps of *Andricus quercuscalicis* and *A. quercuscorticis*.



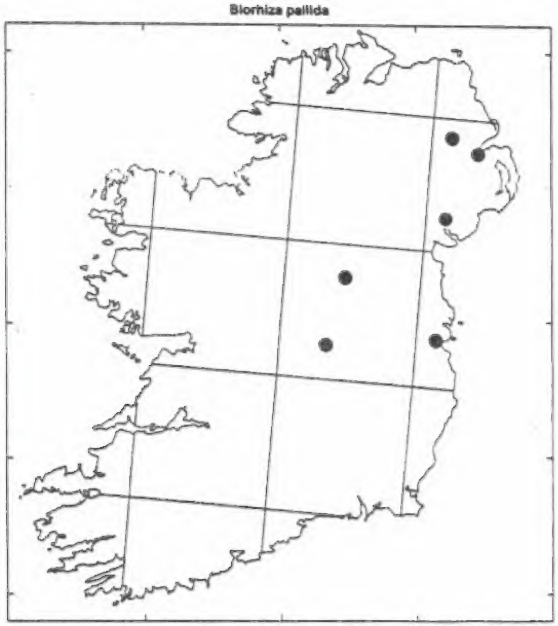


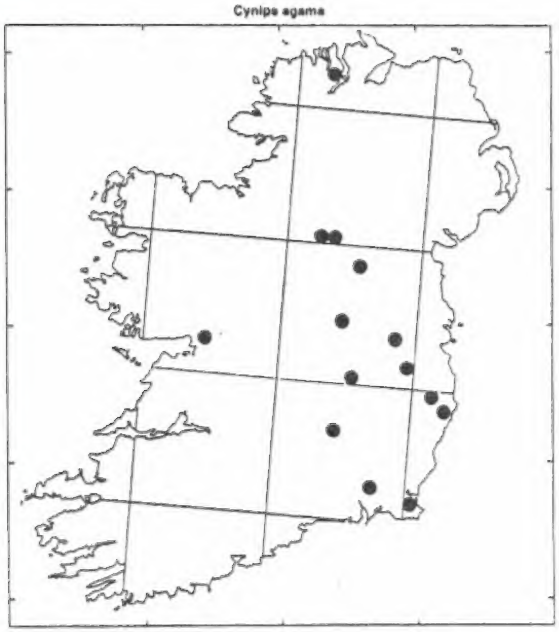
FIGURES 17-18: distribution maps of *Andricus quercusradicis* and *A. quercusramuli*.



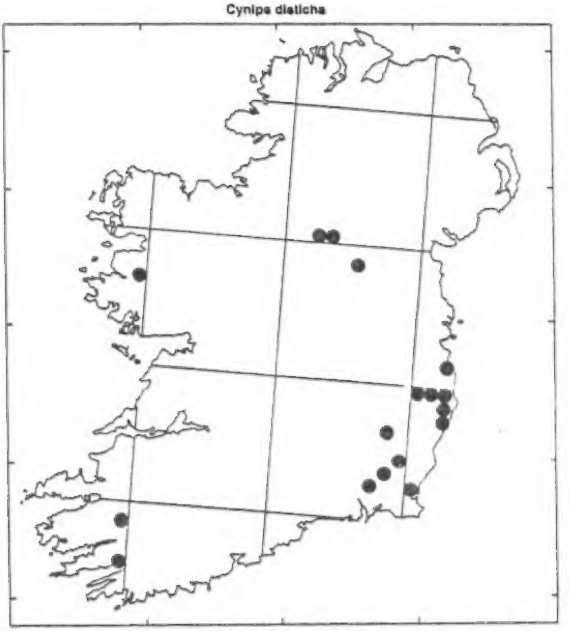


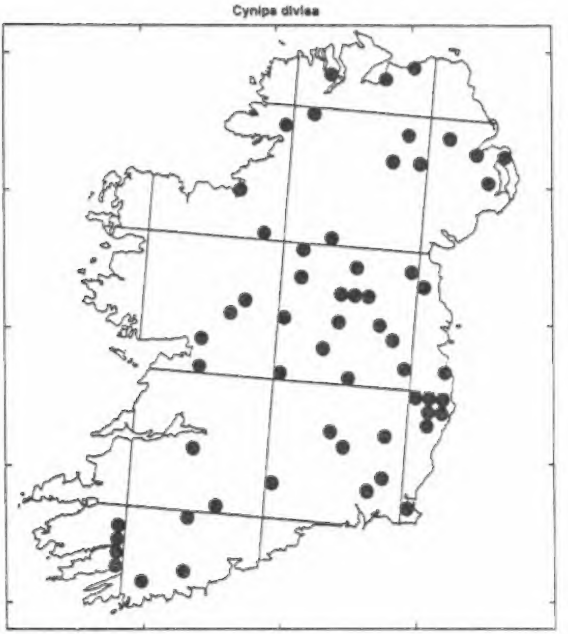
FIGURES 19-20: distribution maps of *Biorhiza pallida* and *Cynips agama*.



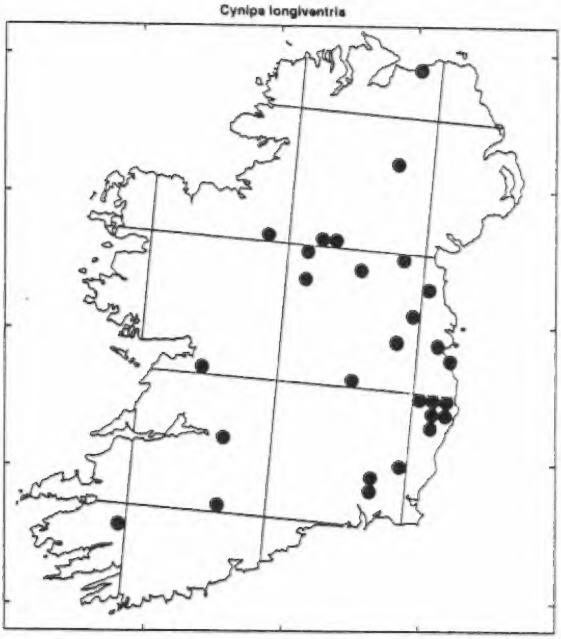


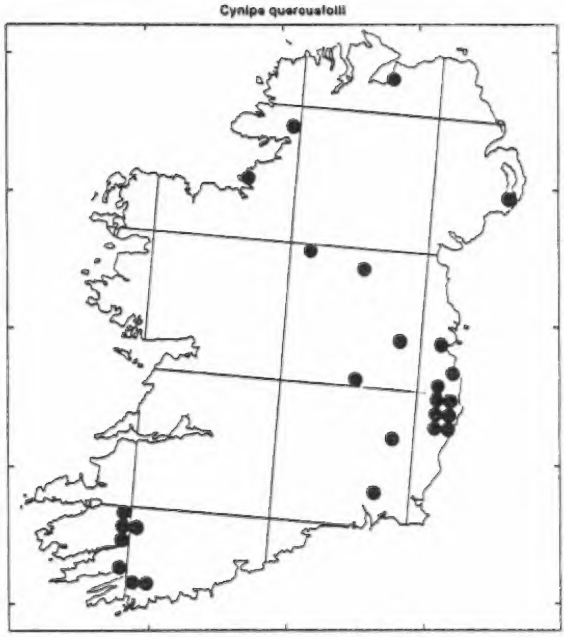
FIGURES 21-22: distribution maps of *Cynips disticha* and *C. divisa*.



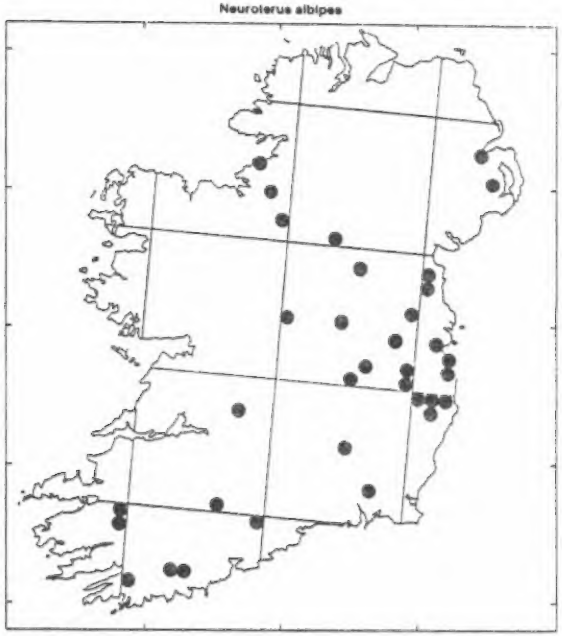


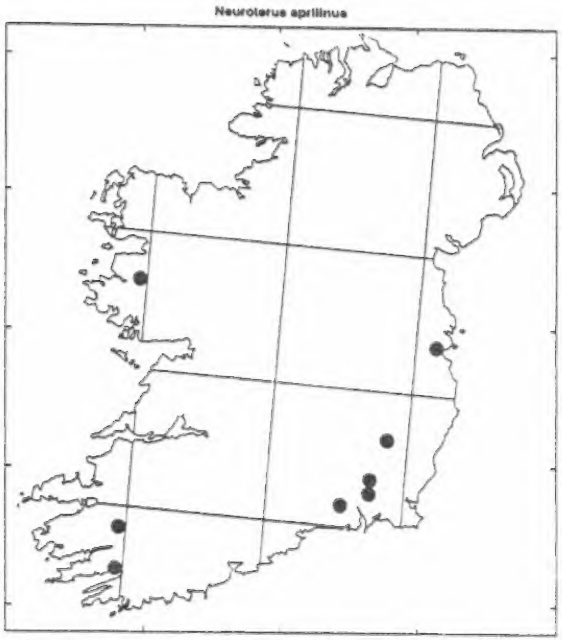
FIGURES 23-24: distribution maps of *Cynips longiventris* and *C. quercusfolii*.



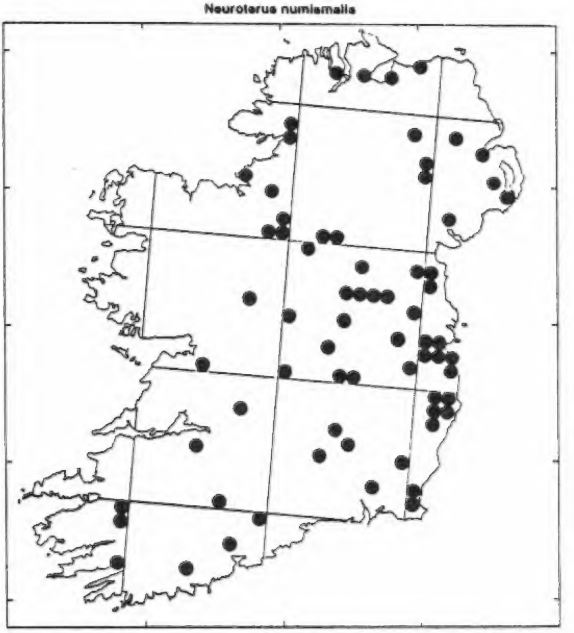


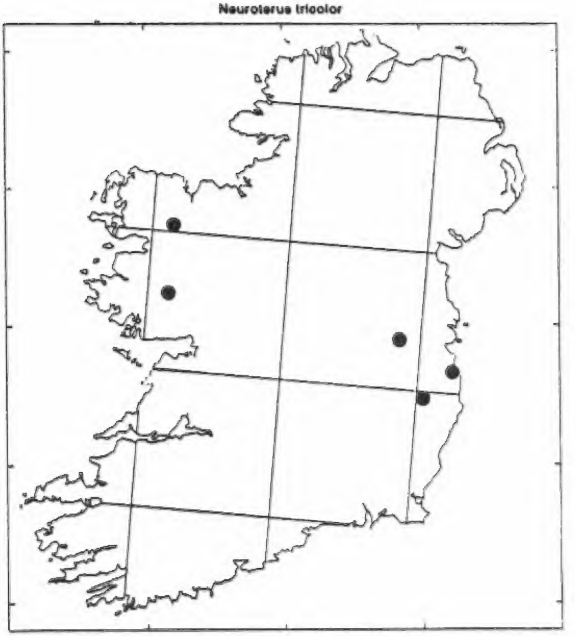
FIGURES 25-26: distribution maps of *Neuroterus albipes* and *N. aprilinus*.



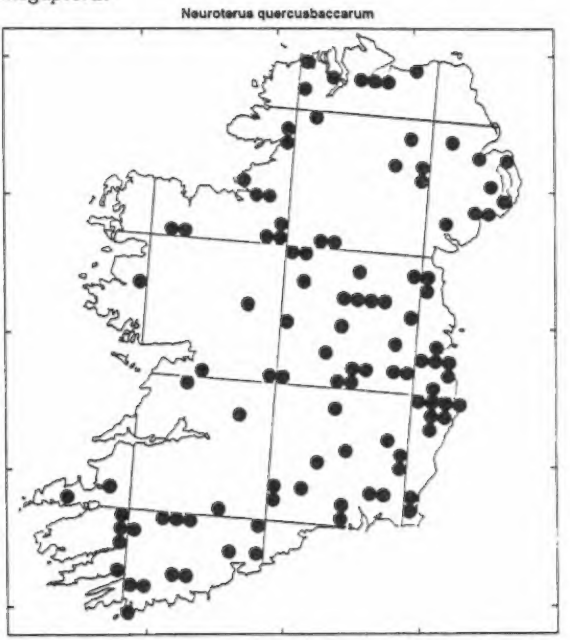


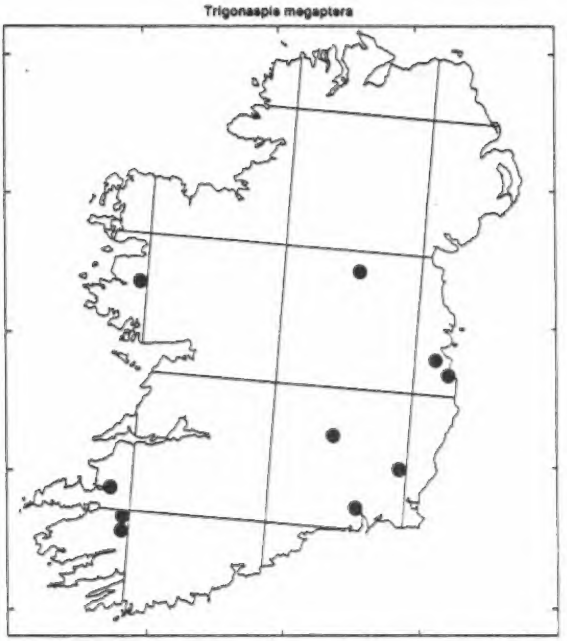
FIGURES 27-28: distribution maps of *Neuroterus numismalis* and *N. tricolor*.





FIGURES 29-30: distribution maps of *Neuroterus quercusbaccarum* and *Trigonaspis megaptera*.





Bull. Ir. biogeog. Soc. No. 18 (1995)

THE DISTRIBUTION OF THE AQUATIC AND SEMI-AQUATIC HETEROPTERA IN NORTHERN IRELAND

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Summary

1. Records of semi-aquatic and aquatic species were collected from 307 sites throughout Northern Ireland.

2. 40 species of Aquatic Heteroptera were recorded, several for the first time for many years. Several rare species were recorded including *Corixa iberica* Jansson, *Limnoporus rufoscutellatus* Latreille and *Sigara fallenoidea* Hungerford.

3. Important sites for aquatic Heteroptera have been identified, including Montiaghs Moss, Co. Antrim; the lakes and ponds on the Garron Plateau; the Rathlin Island ponds; and the large lakes Lower L. Erne, L. Neagh and L. Beg.

4. Small lakes, while in total supporting a large number of species, were individually found to be poor in species.

Introduction

The aquatic and semi-aquatic Heteroptera are amongst the most conspicuous members of the freshwater insect fauna of Ireland. In terms of the numbers of species they constitute just a small but ecologically distinct part of the Order Hemiptera. Forty-nine species in eight families have been recorded from Ireland and these are listed in Appendix 1. This compares with 61 species in Great Britain. This paper presents a summary of the results of a survey of the distribution of these insects in Northern Ireland. This was grant-aided by the Environment Service of the Department of Environment for Northern Ireland and an additional grant was obtained from the Praeger Fund of the Royal Irish Academy. A full copy of the results has been presented to both organisations.

Historical records and literature on the group

The only complete account of the Irish Heteroptera was written by Halbert in 1935. 43 species of aquatic Heteroptera are listed as occurring in Ireland in this paper. There have been a number of additions to the Irish list published since, including Walton (1936, 1967, 1980 and 1981), Pearce and Walton (1939), Brown (1951), O'Connor and Norton (1977) and McCarthy and Walton (1980).

Within the literature on the Irish aquatic Heteroptera there is little pertaining to Northern Ireland. Halbert (1935) includes records from Northern Ireland, but as most date from the turn of the century and the records are often unspecific as to locality and habitat, little can learnt apart from the recorded presence or absence of individual species within the region. The next significant publication was that of Macan in 1954. This included data on the distribution of corixids in some northern Irish lakes and included the first Northern Irish records of *Sigara fallenoidea* Hungerford (named *S. pearcei* Walton in this paper). In 1958 Leston produced a summary paper giving vice-county lists for the Nepomorpha in Ireland. Few northern records had been added to those published by Halbert and no details are given for the source of these records. The only other recent publication with Northern Irish records of this group is Flower (1982), who gives records from ponds and lakes on Rathlin Island, Co. Antrim.

Significant lists have been produced for other areas of Ireland by Lansbury (1965) for the Burren, O'Connor *et al.* (1986) for the Killarney lakes, Kirby (1983 and 1991) for the south-western counties, Crisp and Heal (1958) for western Connemara and Reynolds (1985) for the Aran Islands. The European Corixidae are covered by Jansson (1986), which includes distribution maps of all the Irish species, including most significantly *Corixa iberica* Jansson and *Sigara fallenoidea*. Finally Savage (1989) includes a considerable amount of ecological information on the group, including some of Irish significance. This includes further information on *Corixa iberica* and also a checklist of the British and Irish fauna.

Aims of the study

This study was initiated by a training course held in June 1988 in Co. Fermanagh organised by the Environment Service in order to encourage the study of insect and other groups in Northern Ireland. Following this the author started sampling sites for aquatic Coleoptera. As

the aquatic Heteroptera were usually caught with the Coleoptera the study expanded to include them. The results of the water beetle sampling have already been used in a publication on the classification of the species assemblages (Foster *et al.*, 1992). The aim of both studies was to sample the range of still water habitats principally lakes found throughout Northern Ireland. Rivers have largely been ignored apart from some small-scale sampling in order to detect the presence of some species.

Methods

Freshwater habitats were sampled using a robust pond net from accessible edges and areas of shallow water. The site was sampled until it was considered that no additional species were being collected. Whilst this was not a rigidly defined method, it was considered that the sampling was generally thorough, as many species are difficult to identify in the field and the tendency was always to take voucher specimens for later identification. No attempt was made to get quantitative data. Whilst under-recording is inevitable and always an unknown quantity the following point is relevant. Whilst sampling the sites for the aquatic Heteroptera, aquatic Coleoptera were being collected at the same time. This necessitated expending a longer time and greater effort at each site than would have been necessary to sample just the Heteroptera, as there are more species of aquatic Coleoptera and they utilise more micro-habitats.

Systematic recording has covered all the years since 1989. Site visits were carried out during the period from early spring to late autumn each year. Compared to many other insects the aquatic Heteroptera exhibit relatively little seasonality. Most species are adult for one year, though they are generally inactive in winter. The adults of most of the Heteroptera however all die off in early to mid-summer, so there is a period in June or July when the adults are very hard or impossible to find. Less recording was therefore done in this mid-summer period.

Specimens were also obtained from two other sources. The Northern Ireland Lake Survey (hereafter referred to as NILS) collected, in the course of the sampling of aquatic macrophytes, some invertebrates including aquatic Heteroptera. These samples are inevitably biased however as they were taken generally in the summer months and would not have detected the semi-aquatic species. Despite these provisos the NILS samples have added many valuable records especially from reservoirs, a habitat which otherwise would not have been well-represented.

The second source was the collections made by Richard Weyl of the Environment Service, who provided specimens of aquatic Heteroptera collected whilst sampling for Coleoptera. The material collected from both sources have all been checked and identified by the author.

The specimens were identified using the available literature. For the aquatic Heteroptera, Savage (1989) is the standard, most recent treatment of the British and Irish fauna. Reference was also made to Southwood and Leston (1959), Macan (1965) and Jansson (1986).

The specimens have all been kept and the majority have been stored in 70% ethanol. Apart from a small reference collection the remainder has been given to the Ulster Museum. All the records have been input on to a computer database using the Recorder package and so they will be incorporated into the Northern Ireland Biological Records Centre (NIBRC) database which is held at the Ulster Museum.

Results

Records of this group have been gathered from 307 sites throughout Northern Ireland. Each site has been defined as a separate water body or occasionally a distinct habitat type within a water body. The number of sites sampled in each of seven broad habitat categories is given in Table 1. Map 1 shows the distribution of these sites throughout Northern Ireland. Coverage has clearly not been even, though this is partially due to the distribution of lakes, which was the main habitat that was sampled (see NILS volume 1). Appendix 1 lists the sites sampled by county and four figure grid reference and gives the species recorded (referred to by the number given to each species in the species accounts) and the Recorder site number under which they are entered in the NIBRC database. All the records gathered for this paper have been entered on the Recorder package under these site numbers. Anyone seeking further data on the records can consult the author or the NIBRC for the details of these.

The species accounts are laid out in a standard format and are in systematic order. For each species recorded in this survey of Northern Ireland there is a distribution map which shows all the site records as dots. Solid dots are records obtained in this survey apart from a few extra limital records from adjoining counties in the Republic. A few maps have additional records derived from either Macan (1954) or Flower (1982). These have hatched shading. The species text gives a brief account of the main habitats utilised and notable features of the distribution.

The occurrence of each species in the main habitat categories is given in Table 2. These accounts and statistics used in Table 2 are based solely on the survey records.

Following the species accounts there is a discussion of the main habitats surveyed and the species communities found. This highlights the main features of importance of the habitat.

Species accounts

1. *Hebrus ruficeps* (Thomson) (Fig. 1)

This tiny bug lives amongst moss at the edge of acid ponds, rivers and lakes (Southwood and Leston, 1959; hereafter abbreviated to S+L). It is said to be associated solely with *Sphagnum* (Brown, 1948; Kirby, 1992). A wider habitat association is mentioned in S+L and Dolling (1991). Halbert (1935) considered it to be an abundant and probably widespread species. However since then there appears to be only one published Irish record (Kirby, 1983) who expressed surprise at only finding it at one site in Co. Kerry.

H. ruficeps was recorded from three sites. These were a fen in Co. Down and two lakes in south-east Co. Fermanagh. At all three sites individuals were found by trampling down moss carpets at the edge of the open water. As this technique is required to record *Hebrus*, it may be under-recorded. However many water beetles occur in similar situations and this microhabitat was sampled when noted at a site. It may be significant that at all three sites the species was found in carpets of 'brown mosses', rather than *Sphagnum*, beside non-acid pools or lakes.

2. *Hydrometra stagnorum* (L.) (Fig. 2)

This insect, commonly called the water-measurer, is found throughout Britain and Ireland. *H. stagnorum* is a common species found at lowland lakes of all sizes and of all types from eutrophic reed-fringed to oligotrophic peaty lakes. It was only rarely found in other habitats and it was not found at high altitudes. The recorded distribution covers the entire province. The species was found most commonly where there had been heavy grazing of the marginal vegetation. In these situations many individuals were seen walking amongst the short vegetation and in the flooded hoof marks. Whilst this may simply have been because of the conditions making it relatively more conspicuous, it is certainly true that *H. stagnorum* occurs at the sheltered edges of water bodies (Andersen, 1982). It can be found in these situations beside fast-flowing rivers both in Northern Ireland and in Connemara (pers. obs.).

3. *Velia caprai* Tamanini (Fig. 3)

The two species of water cricket, as they are commonly known, are easily recognised. This, the commoner species, characteristically forms large aggregations on the water surface. The identity of the individual species was only resolved in 1951 and so all earlier records are unreliable (Brown, 1951).

The map shows that *V. caprai* was rather locally distributed with most records concentrated in upland areas. In areas such as the Mourne Mountains, Co. Down the species has proved to be very common occurring on even the tiniest areas of open water associated with streams and flushes and it is considered that it will be found to be common in other areas if coverage is extended. At many of the sites it was the only aquatic heteropteran present. In lowland areas it has been less commonly recorded but again will probably be found to be ubiquitous on streams and rivers. It will also occur on ditches and peat cuttings as well as lake margins, e.g. on drainage ditches cut through a bog preparatory to commercial peat harvesting.

V. caprai is distributed throughout Britain and Ireland, including some of the remoter Scottish Islands and up to at least 720m (S+L). Lansbury (1965) records the species from the Aran Islands and Kirby (1983) found *V. caprai* widely and often abundantly on streams, bog pools and lake margins up to 610m in Co. Kerry. In Halbert (1935), which lists many records for *Velia* (which may refer to either species) a wide Irish distribution is indicated, including such remote localities as Tory Island. *V. saulii* Tamanini is found in northern Britain and since 1977 has been recorded at several localities in Cos. Roscommon (O'Connor and Norton, 1977), Wicklow (O'Connor and Bracken, 1980) and Kerry (Kirby, 1983, 1991) but has not yet been recorded from Northern Ireland.

4. *Microvelia reticulata* (Burmeister) (Fig. 4)

This tiny predacious bug lives typically in large groups on the water surface, especially in areas of open water amongst stands of emergent vegetation (S+L). It is a common species throughout Britain. Two other species *M. buenoi* Drake and *M. pygmaea* (Dufour) also occur in southern England, and the latter has also been found at three sites in Co. Cork (Walton, 1981).

Most of the records of *M. reticulata* were from the west of the province where it was found principally at the edge of small mesotrophic lakes. It was also recorded at pools in fens and cutover bogs, and at four sites on Upper L. Erne and one site on L. Neagh. The sites were

generally at low altitude but it was found above 300m in Co. Fermanagh and in the Mourne Mountains, Co. Down.

5. *Gerris costai* (Herrich-Schaeffer) (Fig. 5)

Whilst there are records of *G. costai* from low-lying pools on the north coast it is predominately an upland species. In upland areas it was generally a common species especially on small, shallow peaty pools, frequently along with *Velia caprai*, but with no other gerrid species. The records from the north coast are of single individuals on temporarily flooded dune slacks. Whilst these may represent stray individuals, earlier Irish records indicate this is not exceptional and it also occurs in similar situations in Scotland (Halbert, 1935; S+L). The distribution in Northern Ireland shows *G. costai* is found in all the major upland areas, except for the Co. Antrim uplands and notably the Garron plateau. Its absence from this area is probably due to lack of recording in its favoured habitat.

Most of the previous published Irish records for this large gerrid are from upland and northern areas although it has also been recorded at coastal localities in the west of Ireland (Halbert, 1935). The only Northern Irish record given in Halbert (1935) was from a small pool on the summit of Slieve Gullion in Co. Armagh. The only recent published Irish record is one from the Aran Islands (Reynolds, 1985). A similar pattern of distribution and habitat utilisation is found in Britain (S+L; Savage, 1989).

6. *Gerris lateralis* Schummel (Fig. 6)

The first Irish records of this species were published in Pearce and Walton (1939) who record it from a number of sites in Co. Dublin and Co. Kerry. The only other published record is from Inishmore in the Aran Islands (Reynolds, 1985). Reynolds states it be a common Irish species, but there appears to be no published evidence for this. Savage (1989) indicates the species to be uncommon throughout Britain and Ireland. In Great Britain *G. lateralis* has a predominately northern distribution with records from East Anglia northwards. Its habitat is stated to be bog pools and ditches (S+L).

This was the least commonly recorded species of true *Gerris* in Northern Ireland. It was recorded from seven widely scattered sites. Most of the specimens were found on small shallow pools. At four of the sites these pools were on long-disused and tree-covered cutover bogs. Another record was from a shallow brackish pool in an area of reclaimed estuarine foreshore.

The remaining two were found at lakes but the exact habitat details are unknown. The cutover bog pools on which *G. lateralis* was found were shaded and filled with undecayed leaves and woody debris. Little vegetation was present and this consisted of a few sparse *Carex* plants and small amounts of *Sphagnum* mosses. No other *Gerris* species were found on these pools. This would appear to be a characteristic habitat for this species and this may account for it scarcity as these pools were not often sampled. In Europe this species is the most tolerant gerrid of dense vegetation and in Denmark it 'is mostly restricted to pools with much vegetation and small areas of free water surface' (Andersen, 1982). The habitat utilised here therefore appears to be somewhat different, but it clearly has found a niche in these shaded pools.

7. *Gerris thoracicus* Schummel (Fig. 7)

G. thoracicus is a medium-sized pond-skater, very similar in appearance to *G. costai*, but smaller. Both species were typically found on pond sites, but differ in altitudinal distribution. *G. thoracicus* appears on the basis of the survey results to be almost entirely a lowland species; only one of the sites at which it was found was above 50m. In contrast *G. costai* was mostly confined to upland localities. The two species were found together at one of the north coast dune sites.

Whilst *G. thoracicus* was found at L. Beg and Upper L. Erne, along shallow margins with grazed but open fen, the species was most commonly found in shallow unvegetated pools. In northern Europe *G. thoracicus* is said to be tolerant of dense vegetation (Andersen, 1982). Many of the records were from coastal localities including pools on rocky shores just above the splash zone as well as in small saltmarsh pools and dune slacks. Inland records included pools in heathland and remnant areas of bog, and also shallow pools in quarries and other disturbed sites. On coastal pools in particular it was often the only heteropteran present. In other parts of Ireland *G. thoracicus* is a common inhabitant of pools in saltmarshes (Halbert, 1935; pers. obs.). Other Irish records of *G. thoracicus* are published in Kirby (1983, 1991) and Lansbury (1965).

8. *Gerris argentatus* Schummel (Fig. 8)

This is distinctly the smallest of the Irish gerrids. The identity of the adults can be confirmed by looking for the silvery patches of hairs at the rear of the pronotum, which are relatively easy to see in the hand.

G. argentatus was recorded from 23 sites, which were all lakes or large ponds. There was one record each from Lower and Upper L. Erne, Co. Fermanagh. The other lakes had little obvious in common. They tended to be mesotrophic to eutrophic lakes, of small to medium size, and at low to mid-altitudes. *G. argentatus* was recorded commonly only on lakes in Co. Fermanagh with just a few records elsewhere in Co. Tyrone and central Co. Down.

There have been few published records of this species. Only eight records were listed in Halbert (1935), who considered that it was less common than *G. odontogaster* (Zetterstedt). Half of the listed records of *G. argentatus* were from Co. Armagh and Co. Down. The only other published records are from four sites in Co. Cork (Pearce and Walton, 1939) and one site in Co. Clare (Lansbury, 1965).

9. *Gerris lacustris* (L.) (Fig. 9)

G. lacustris is often considered to be the commonest species of pondskater. In this survey it was recorded from 41 sites, three more sites than the next most frequent species, *G. odontogaster*. Whilst these two species overlap considerably their broad distribution did differ to some degree. The distribution of *G. lacustris* showed increased frequency of occurrence in the north and west, whereas that of *G. odontogaster* shows increasing frequency towards the south and east.

The records show a preference for lowland lakes but it also occurs frequently, and often in abundance, on smaller areas of still water especially on bog pools. *G. lacustris* was the only gerrid apart from *Aquarius najas* (De Geer) found on flowing water. It was recorded from L. Beg (108) and on single sites on L. Neagh (138) and Lower L. Erne (113). There were records from small lakes throughout its mapped range. At lakes it was found with *G. argentatus* and at pool sites it was frequently found with *G. odontogaster*.

The records were predominately from lowland sites, with just three above 200m. Kirby (1983) recorded it as commonest gerrid in the Killarney area below 30m. However a record of *G. lacustris* from a peaty pool in Co. Kerry at 600m is mentioned in S+L. It was the commonest and most widespread gerrid species at the sites in Co. Clare sampled by Lansbury (1965). Halbert (1935) considered the species to be common and widely distributed.

10. *Gerris odontogaster* (Zetterstedt) (Fig. 10)

G. odontogaster is an easy species to identify in the field. Males have two prominent toothed

projections on the ventral surface of the abdomen which can easily be seen.

The species was recorded widely across the south of Northern Ireland. There was also an eastern bias to the records with a majority of records from Co. Armagh and Co. Down. Whilst it was most frequently recorded on small lakes, a high proportion of records were from pools. These included most of the major pool systems on cutover bogs and fens in the east of Northern Ireland. The records from Co. Fermanagh were predominately from lakes, including sites on both Lower and Upper L. Erne. On these large lakes it was found on sections of shoreline with sparse fringing swamps and *Carex* fen. The only Co. Londonderry record of *G. odontogaster* was from flooded peat cuttings in a cutover bog. Lowland records predominated; there were only two above 250m.

Halbert (1935) considered that the species was probably common. There are recent published Irish records from Co. Clare (Lansbury, 1965), Co. Kerry (Kirby, 1983) and Co. Cork (Kirby, 1991).

11. *Aquarius najas* (DeGeer) (Fig. 11)

This was the least recorded gerrid species. However this may be due to the lack of recording in suitable habitat as *A. najas* is typically a riverine species, though it can also be found on lakes. It is found throughout Britain (S+L). Halbert (1935) gives records from the Cusher River, Co. Armagh and the River Lagan at Lisburn. The species has been recorded from several localities in Co. Kerry by Kirby (1983, 1991) and the author (per. obs.). These sites ranged from sea level to 560m and included rivers and lakes. The only site found for *A. najas* was the River Blackwater at Benburb, Co. Tyrone on a stretch of the river of moderate to fast flow.

12. *Limnoporus rufoscutellatus* Latreille (Fig. 12)

This impressive insect is the largest pondskater found in Ireland. The first Irish records were collected in the 19th Century but no locality information exists for these (Halbert, 1935). Of the 20th Century records, all but one have found in Co. Kerry, where it was collected from several localities by Edwin Bullock between 1929 and 1958; this includes 13 individuals from Cahernane, Killarney the only record involving more than one specimen (O'Connor, 1986). The first record away from the south-west was of one collected at Shandangan L., Co. Clare in September 1960 (Lansbury, 1965). The status of this species is still open to doubt according to

the literature. Whilst O'Connor (1986) suggests that it is a resident species, the opposite is suggested by Dolling (1991), who writes that it may no longer be extant in Ireland. The British status is presumed to be that of a migrant, an opinion which has not changed.

L. rufoscutellatus was recorded at four scattered sites in Northern Ireland, two in Co. Fermanagh and one each in Co. Tyrone and Co. Antrim. Details of the records are as follows:-

Co. Fermanagh H33 H3029, shoreline of Upper L. Erne in Corradovar Townland, 28 June 1994; four individuals were recorded along a 1km stretch of the lakeshore amongst the sparse marginal *Phragmites* and *Scirpus* swamp; Braade H0454, June 1988, small mesotrophic peaty pool in upland heath.

Co. Tyrone H36 H3576, Claraghmore L., 26 August 1990, mesotrophic lake.

Co. Antrim H38 J0965, Montiaghs Moss, June 1992, small pool in extensive area of cutover bog.

Based on these records it would seem that there is no reason to doubt the premise that the Irish population of *L. rufoscutellatus* is resident. This is supported by the fact that the records now span the last 70 years, covering five counties from the south-west to the north-east. This geographical spread is unlike what one would expect for a migrant species. The taking of multiple specimens at two of the sites also indicates a resident population. Another basis of considering the native status of *L. rufoscutellatus* is that it fits into a pattern shown by a small number of freshwater species which are found predominately in northern Europe and Asia which have outlying populations in Ireland, yet are absent from Britain. This includes the damselfly *Coenagrion lunulatum* Charpentier, the whirligig beetle *Gyrinus natator* (L.) and the corixid *Sigara fallenoidea*.

13. *Nepa cinerea* L. (Fig. 13)

As this is an instantly recognisable insect, even in its young stages, no voucher specimens were taken. The only difficulty in recording it would come from its habit of feigning death and hiding amongst debris. Even so as it is a large insect even this would be unlikely.

N. cinerea was the second most frequently recorded species in the survey. It was found at 24% of the surveyed sites. It was recorded almost exclusively from still-water sites, and all except two records were from lakes or ponds of some type. The other sites were a ditch linking two lakes and a disused section of a canal. There were no records from rivers or reservoirs.

N. cinerea shows a preference for moderately eutrophic and mesotrophic lakes, but it also occurs in acid pools on cutover bogs. Apart from flowing water there would appear to be few open-water habitats not utilised by *N. cinerea*. Contrary also to S+L, which states that weeds are always present, it was been recorded in shallow peaty pools with no aquatic vegetation. This includes several sites in Northern Ireland and a site just outside the survey area in Co. Leitrim.

The species occurred frequently at sites up to 200m, but was rare above this. The highest site was at 340m on the Garron plateau. Elsewhere in Ireland *N. cinerea* is common and generally distributed, extending to several of the offshore islands in the west (Halbert, 1935).

14. *Notonecta glauca* L. (Fig. 14)

N. glauca was the commonest species recorded. There were records from 117 sites and it was often abundant at individual sites. The recorded distribution covered the entire province and most habitat types. The altitudinal range was the widest of any species, with records from sea-level to the highest site sampled at 475m. The only exception to this ubiquity was its absence from reservoirs. Although the majority of these sites were covered by the lake survey no records of *N. glauca* were obtained. The reasons for this are unclear. Under-recording would seem not to be the cause as the NILS samples provided 15 additional site records from natural lakes. The sampling technique used in the lake survey appears not to be biased against detecting this species. Neither would the explanation appear to be lack of mobility because *N. glauca* is known to be a strong flier.

Elsewhere in its range in Britain and Ireland *N. glauca* is abundant. Halbert (1935) states it to be common and widespread. Other Irish records are given in Macan (1954), Lansbury (1965), O'Connor and Bracken (1980), Flower (1982) and Kirby (1991).

15. *Notonecta obliqua* Gallen (Fig. 15)

S+L states this species replaces *N. glauca* at high altitudes and it is suggested that it is more tolerant of cold waters. The data from this survey indicate this is too simplistic an explanation. Most of sites at which *N. obliqua* was recorded were below 200m, whereas *N. glauca* was found at 14 sites above 200m and as high as 475m, which was the highest site sampled. There were no records of *N. obliqua* from any of the major upland blocks which all support other upland species and from which *N. glauca* was recorded. As *N. glauca* is so widespread it is not

surprising that the species overlap and at three out of the seven sites at which *N. obliqua* was found, *N. glauca* was also present. However at all but one of the recorded sites only single individuals of *N. obliqua* were caught. The only exception to this was at the cutover bog at Curran, Co. Londonderry, where *N. obliqua* accounted for 40% of the *Notonecta* caught in the many acid pools.

The species was very localised with records only from widely scattered sites on the north coast of Co. Antrim, including Rathlin Island, and at one site each in Co. Tyrone, Co. Down, Co. Londonderry and Co. Fermanagh. Elsewhere in Ireland it has been found in oligotrophic lakes in Co. Kerry, sea-level lakes and ponds on the Mullet peninsula in Co. Mayo, a turlough in Co. Mayo, pools in cutover bogs in Co. Sligo and mesotrophic lakes in southern Co. Donegal (pers. obs.). Lansbury (1965) recorded it from a limestone lake in Co. Clare.

16. *Micronecta poweri* (Douglas and Scott) (Fig. 16)

This, one of the smallest species of aquatic Heteropteran, apparently has one of the most restricted distributions. However its small size may mean it was under-recorded.

It was recorded at seven sites in Co. Fermanagh and one in Co. Tyrone. The majority of the records were from the large lakes in Co. Fermanagh (Lower and Upper L. Erne and L. Melvin), the only exceptions being from Tullyvocady L. and the River Derg at Castlederg, Co. Tyrone. All the sites were from areas of open water with fine gravel or stony beds.

M. poweri is a species of rivers and lakes in Britain. Sandy bottoms are a feature of many of the sites, and is stated to be intolerant of organic pollution (S+L). Leston (1958) notes records from ten vice-counties spread throughout Ireland. Halbert (1935) mentions records from Toome, Co. Antrim and the R. Faughan in Co. Londonderry. During the study of the Killarney Lakes, O'Connor *et al.* (1986) found it at several stations. Records from Cos Cavan and Wicklow are given in O'Connor and Bracken (1980).

17. *Cymatia bonsdorffii* (Sahlberg) (Fig. 17)

The male and female *C. bonsdorffii* are one of the few corixids that can be distinguished in the field. The males have characteristic spiky, elongated forelegs and a domed head unlike any other Irish species. The females can be identified by their size, shape and the distinct green colour to the underside. The species also differs from most in being solely predatory. It feeds on a wide variety of small invertebrates which it captures by ambush (Savage, 1989).

C. bonsdorffii is predominately a lowland species. 80% of records were from sites below 100m with just two sites at over 200m. *C. bonsdorffii* was widely recorded in small lakes and ponds across the southern parts of Northern Ireland. The lakes were generally medium-sized mesotrophic to slightly eutrophic lakes with the majority between 1 and 20ha in area. The species was absent from very eutrophic lakes. As well as these lakes it was found in pools on all the major cutover bogs and fens in Co. Armagh and Co. Down. In the western counties all the records were from lakes, including three sites on Upper L. Erne. It was not recorded from any of the Lower L. Erne sites surveyed in this study but there is a published record from this lake (Macan, 1954).

Halbert (1935) considered *C. bonsdorffii* to be 'widely distributed and common'. He listed a few records from Co. Armagh, Co. Down and Co. Antrim. Twenty vice-counties had records in Leston's list (1958), including Co. Fermanagh. Despite this apparent generality, neither Kirby (1983) nor O'Connor *et al.* (1986) contain records of the species from the Killarney area. It was commonly recorded in Co. Clare by Lansbury (1965). Apart from the record in Macan (1954), the only other published Northern Irish record is in Flower (1982), who recorded it from one lake and a pond on Rathlin Island.

18. *Glaenocorisa propinqua* (Fieber) (Fig. 18)

This is one of the most interesting species of corixid found in Northern Ireland. It is a local species in Britain with two apparently separate populations in the south of England and from north Wales northwards to northern Scotland (S+L; Jansson, 1986). It has a markedly north-western distribution in Europe, from north-eastern France to Finland with a few apparently isolated populations in central Europe (Jansson, 1986). *G. propinqua* exists in two subspecies which intergrade where they meet. The forms can be separated by the shape of the male forelegs. The southern populations are subspecies *propinqua* whilst the northern part of the range is occupied by subspecies *cavifrons* Thomson. Both forms have been recorded in Ireland (Jansson, 1986). All the specimens found in Northern Ireland were referrable to *cavifrons*. The species is pelagic and in parts of Europe which have been subjected to acidification and loss of fish populations from lakes it has become very common (Savage, 1989).

G. propinqua was recorded from seven sites. Four of these were in Co. Antrim (including three on the Garron plateau), with single records each from the Mourne Mountains, Co. Down,

Cuilcagh, Co. Fermanagh and Slieve Beagh in Co. Tyrone. Apart from one of the Co. Antrim sites, all the records came from upland oligotrophic lakes. The remaining and most interesting record was from a deep pool on a lowland cutover bog, Montiaghs Moss. This would appear to be the first record from such a site as the few previous Irish records have all been from lakes. In upland localities *G. propinqua* was typically found with *Arctocorisa germari* (Fieber) and/or *Callicorixa wollastoni* (Douglas and Scott).

Other Irish records have been from lakes in Co. Kerry (Halbert, 1935; Kirby, 1983), Co. Donegal (Macan, 1954), Co. Galway (Walton, 1967) and several lakes on Roundstone bog (Crisp and Heal, 1958). A record from eastern Ireland is mapped in Jansson (1986). The seven records from Northern Ireland significantly extends its distribution and the number of recorded sites.

19. *Callicorixa praeusta* (Fieber) (Fig. 19)

This was one of the most widely distributed species and it was the most frequently recorded corixid. Records came from all counties and also Rathlin Island. In Northern Ireland *C. praeusta* is predominately a lake species, with the majority of the records from small lakes under 10ha. It was found in eutrophic lakes and also not infrequently in base-poor lakes. The species was also found to occur in all of the major large lakes which were covered in the survey. There was a small number of records from reservoirs, pools in cutover bogs and heathland, and also coastal, probably slightly brackish, pools. The majority of the recorded sites were lowland (68% below 100m); the few records above 200m related to the base-poor lakes. These latter sites were all in Co. Fermanagh and adjacent areas of Co. Tyrone.

20. *Callicorixa wollastoni* (Douglas and Scott) (Fig. 20)

The distribution of this species is one of the most easily interpreted as it is clearly related to altitude. It was the only species not recorded at sites below 100m with 84% of the sites were above 300m. As well as the altitude of the site, the size of the water body is clearly an important factor as *C. wollastoni* shows a preference for small lakes and pools. Apart from three sites, all the recorded sites were either small ponds or lakes less than 2ha in extent (maximum 5.5ha). The species was occasionally the only corixid found at some of the smaller pool sites. In the lakes it was found particularly with *Glaenocorisa propinqua* and *Hesperocorixa sahlbergi* (Fieber). It was notably absent from the large lakes on the Garron and

the other montane areas where the other upland species such as *G. propinqua* and *Arctocorisa germari* were found. This avoidance of large sites may be related to fish predation, which is known to affect the corixid fauna of lakes (Savage, 1989).

C. wollastoni was found in suitable habitat in all the upland areas of Northern Ireland where it replaces *C. praeusta* in these unproductive sites. There is however some overlap in their altitudinal distribution though the species were never found together. Records from NILS sites indicate a distribution limited to the predominately upland, base-poor lake types.

Leston (1958) suggested a coastal distribution for *C. wollastoni* in Ireland. This however is simply an artefact of the vice-county maps as the upland areas in Ireland are mainly found in vice-counties around the coast. Leston (1958) mapped records for Co. Armagh, Co. Londonderry and Co. Down within Northern Ireland. The Co. Londonderry record is listed in Halbert (1935), referring to a record from Culkeeragh moss which is a lowland site and may well be a misidentification. Other records of *C. wollastoni* mentioned by Halbert have been found to be incorrect (O'Connor *et al.* 1986). Kirby (1983) recorded *C. wollastoni* commonly in the Killarney area in bog pools and loughs up to 780m.

21. *Corixa dentipes* (Thomson) (Fig. 21)

C. dentipes is one of the three large members of the genus along with *C. punctata* (Illinger) and *C. iberica* Jansson. Despite it being the most easily distinguished of the three it was only recognised as occurring in Britain in 1928 (S+L). Halbert (1935) in his account of the Irish Hemiptera, listed only three records. It was not recorded by Kirby (1983) or O'Connor *et al.* (1986) in Co. Kerry. There are published records for Connemara (Crisp and Heal, 1958), Co. Kerry (Walton, 1965), and Cavan (O'Connor and Bracken, 1980).

C. dentipes was recorded from 25 sites. These were mainly lowland eutrophic lake sites including four sites on Upper and Lower L. Erne and L. Beg. The only other records were from pools on cutover bogs. The distribution has a southern and western trend, and is principally Co. Armagh, south-east Co. Tyrone and the Erne valley in Co. Fermanagh. There were few records from Co. Down and Co. Antrim. *C. dentipes* was most frequently recorded at low altitude sites, with the highest record at just 165m. This contrasts with *C. punctata* which was found at much greater altitudes and which was not so restricted to eutrophic sites.

22. *Corixa punctata* (Illinger) (Fig. 22)

This was the most commonly recorded of the three large *Corixa* species, which are the largest species of corixid. It was recorded from all six counties and in all habitats excluding rivers. The range of habitats occupied includes brackish lakes, sheltered bays on the large loughs, peaty pools and upland lakes. It was also recorded from two artificial sites (a flooded quarry and a reservoir). Records came from Upper and Lower L. Erne, L. Beg and L. Neagh. Concentrations of records are apparent around Upper L. Erne and the south-west corner of Strangford L. The majority of the records were from lowland sites but it was recorded at small loughs at 305m on the Garron plateau and in Co. Fermanagh, and in a small pool at 310m in the Mourne Mountains, Co. Down.

Leston (1958) and Halbert (1935) give records from a total of 17 vice-counties and Halbert described it as very common wherever it is found. S+L also described it as often being very common. Whilst widespread in the region, numbers recorded at individual sites were usually small. Habitats mentioned in the literature include brackish sites, weedy ponds and lowland rivers plus temporary pools. This covers many of the habitats in the north but excludes the main habitat type.

23. *Corixa iberica* Jansson (Fig. 23)

Of the three species of large *Corixa* found in Northern Ireland, this species is by far the rarest. The existence of *C. iberica* was not recognised until the 1980s when it was described from Spanish specimens as a new species, distinct from *C. punctata* (Jansson, 1986). An examination of Irish material of *C. punctata* confirmed its presence in Ireland. Apart from the south-west quarter of the Iberian peninsula, and western Ireland, it is also now known to occur in western and northern Scotland and western Norway (Jansson, 1986). The identification of the species, which is keyed out in Savage (1989), is not difficult when adult males are available.

C. iberica was recorded from five sites, all in the extreme north-east of Co. Antrim. Four of the records are from Rathlin Island with a single record from a pool in the floating scraw at the southern end of L. Fadden on Fair Head. This was the highest site, all the Rathlin sites being at less than 50m above sea level. The sites were all small pools in acid and maritime heath. The pools were either unvegetated or with poor fen around the margins with *Eleocharis palustris* (L.) and *Carex rostrata* Stokes. At the five sites *C. iberica* coexisted with a mixture of lake and

pool species, including *Sigara scotti* Fieber, *S. concinna* (Fieber), *Hesperocorixa sahlbergi* (Fieber), *Callicorixa praeusta*, and *C. wollastoni*.

C. iberica appears to be the extreme Atlantic counterpart of *C. punctata* in the north of its range, perhaps with a requirement for the mild, climatic conditions found in maritime areas. However in the southern part of its range, in Portugal and Spain, it occurs inland (Jansson, 1986). Whatever the controlling factors it appears that *C. punctata* is absent from the areas with *C. iberica*, and the latter species is distinct ecologically as well as morphologically. Dolling (1991) however has postulated that *C. punctata* may be in the process of replacing *C. iberica*, which now exists only in relict populations at the western edge of Europe.

24. *Corixa panzeri* (Fieber) (Fig. 24)

C. panzeri was the rarest of the four *Corixa* species recorded. It is one of the two small species of the genus recorded from Ireland. The second of these small *Corixa* species, *C. affinis* Leach, has been recorded only from scattered sites in southern and western counties (Halbert, 1935; Leston, 1958; Lansbury, 1965). Leston listed nine vice-counties with records of *C. panzeri*.

C. panzeri was found at just two sites. One was a pool at the Bann estuary, Co. Londonderry; the second was a flooded clay pit, which is now a reservoir, at Killough Co. Down. In this region the species shows the same coastal bias which is apparent from Halbert (1935). S+L state that *C. panzeri* will occur in brackish sites, but that it is widespread throughout Britain. The latter, however, is not supported by the map shown in Jansson (1986), which shows a southern and coastal distribution.

On continental Europe, *C. panzeri* has a predominately coastal distribution (Jansson, 1986) and so its Irish distribution fits this broader pattern. This would suggest the Irish distribution is not linked to climatic factors as is the case with many insect species which are widespread in southern areas, but in the north of their range become confined to the most climatically favourable areas, especially on the coast. Some further requirement is suggested for *C. panzeri* and this would seem to be a requirement for brackish conditions. If this is true then *C. panzeri* will undoubtedly prove to be rare in Northern Ireland as there are few areas with suitable habitat.

25. *Hesperocorixa linnaei* (Fieber) (Fig. 25)

The distribution of *H. linnaei* shows a marked south-eastern pattern. Most of the records came from Co. Down. It is however found in scattered localities in all other counties and also on Rathlin Island (Flower, 1978). The majority of records were from lowland sites below 100m.

The habitat data shows an almost equal split between pond and lake sites. As well as small lakes it was found in two of the large lakes, L. Neagh and L. Beg. The pond records include acid bogs and fens mostly in the east of the province. At three of these sites it occurred with *H. sahlbergi*, but mostly the two species had separate distributions. As well as lakes and ponds, *H. linnaei* was also found in a flooded quarry and a brackish pool.

The species is found throughout Britain (Savage, 1989) and there are records from scattered localities throughout Ireland (Leston, 1958). It is found in stagnant water with reed-beds including brackish sites (S+L). In the eutrophic lakes in the west Midlands, *H. linnaei* replaces *C. praeusta* and is in turn replaced by *H. sahlbergi* in the most eutrophic sites (Savage, 1989). A more detailed investigation of the distribution of both species would be needed to see if this is also the case in Northern Ireland.

26. *Hesperocorixa sahlbergi* (Fieber) (Fig. 26)

H. sahlbergi was locally distributed in Co. Armagh and Co. Down, west Co. Fermanagh and north-east Co. Antrim. The record mapped for Rathlin Island is published in Flower (1978). It was less restricted to the south-east than *H. linnaei*. Though lakes were the predominant habitat type utilised, the sites varied considerably from medium-sized lowland eutrophic lakes to small, upland mesotrophic lakes. There was one record from a flooded quarry. Pools were also occupied in cutover peat bogs, fens and heathlands throughout its range. Most sites were lowland, though with records as high as 345m in the Garron Plateau.

H. sahlbergi is said to be typical of base-rich sites with high amounts of organic matter. Wooded ponds, ditches and neglected ponds are habitats used in Britain (S+L). The distribution found in this survey, in particular the records from acid pools and base-poor upland lakes, indicate that *H. sahlbergi* is found here in a wider range of habitats. The trend that was found in eutrophic lakes in England, with *H. sahlbergi* occurring in the most eutrophic sites (Savage, 1989), does not appear to hold in Northern Ireland on the evidence of this survey.

27. *Hesperocorixa castanea* (Thomson) (Fig. 27)

Whilst this is predominately a pond species, *H. castanea* was also recorded from small lakes. The two habitats occupied are small upland acidic lakes and pools and disused peat-cuttings in bogs or heathlands. The lakes were all small, the largest having an area of 2ha. All of the sites typically had margins dominated by *Sphagnum* mosses and peaty water. Records were scattered across Northern Ireland, with an apparent concentration in the Mourne Mountains of Co. Down. The species was surprisingly not taken at the classic upland pool systems on the Garron plateau and elsewhere in the Co. Antrim uplands, which support other upland and acidophile species. The bog records include Brackagh Bog, Co. Armagh, which has now very little acid bog remaining and where conditions must be marginal for the species. The altitudinal records indicate a primarily lowland distribution due to the predominance of records from lowland raised bogs. There was also a scattering of records up to as high as 470m.

There were records form 11 vice-counties according to Leston (1958), including Co. Antrim, Co. Londonderry and Co. Armagh in the north. Surprisingly, in view of its habitat preferences in Northern Ireland, there were no records from the raised bogs in midland counties. Kirby (1991) lists recent records from Co. Kerry and Cork from bog pools.

28. *Hesperocorixa moesta* (Fieber) (Fig. 28)

This was the least frequently recorded species of corixid in the survey, with just one record from a shallow pool in a sandpit at the southern edge of the Mournes, Co. Down. Whether the species occurs in natural habitats in the region is not known.

There appear to be few Irish records, though Leston (1958) records it from six counties. However this adds nothing to Halbert (1935). Lansbury (1965) recorded *H. moesta* at two sites in the Burren. The records published in Halbert refer mostly to females and he considered these to be in doubt and probably referrable to *H. castanea*. In Britain most of the records are from southern England (Jansson, 1986). S+L indicate a preference for pools especially temporary ones. This would tie in with the only site found for the species. Dolling (1991) states that *H. moesta* occurs in temporary, and especially woodland pools.

29. *Arctocorisa germari* (Fieber) (Fig. 29)

Apart from a record from a deep, upland pond, this large species was only recorded in lakes in twenty widely scattered localities in all six counties apart from Co. Londonderry. The

species was found in two distinct lake types - base-poor upland lakes and eutrophic lowland lakes, including most of the large lakes. It was found at four localities on L. Neagh, where it appears to be one of the commonest corixids, and from single localities on each of Lower L. Erne, L. Beg and Lower L. Macnean. The lowland lakes sites were in Co. Armagh and central Co. Down.

Halbert considered the species to be local in Ireland and mainly found in the north. Three records all on L. Neagh are listed by Macan (1954) and included on the distribution map. A few vice-county records were added by Leston (1958), who reported it as absent from the south-east. In Co. Kerry, O'Connor *et al.* (1986) found it in the lowland main lakes at Killarney and Kirby (1983) recorded it from small upland lakes. In Britain it occurs locally throughout lowland and upland areas. Its habitat preference is stated by Macan (1965) to include large calcareous lakes and upland pools, often with its upland relative *A. carinata* (Sahlberg) and *Glaenocorisa propinqua*. The former is absent from Ireland, but *G. propinqua* was recorded at several of the upland sites with this species in this survey, and also at a site in Co. Kerry (Kirby, 1983). At the sites on L. Neagh and L. Beg, *A. germari* was frequently found in association with *Sigara fallenoidea* and *S. concinna*.

30. *Sigara dorsalis* (Leach) (Fig. 30)

S. dorsalis was the least frequently recorded of the three medium-sized *Sigara*. It was not as exclusively restricted to lakes as either the two similar-sized species *S. falleni* (Fieber) or *S. distincta* (Fieber). 60% of records of this species were from lakes of all sizes and reservoirs, compared to 78% of *S. distincta* records and 90% of *S. falleni* records. It was however still a widespread species, though largely absent from lowland Co. Down.

Studies in England indicate *S. dorsalis* occurring over a wide range of conductivities except for high conductivity sites, where it is replaced by *S. falleni* (Savage, 1981). This pattern only applied to lakes of intermediate sizes (2-50ha). This may explain the absence of *S. dorsalis* from much of Co. Down and the Upper L. Erne basin as this area has a predominance of eutrophic lake types (NILS, 1992).

Halbert (1935) considered this species to be the commonest corixid in Ireland. The species has been recorded from 23 vice-counties (Leston, 1958). However in his brief survey of Irish lakes it was taken less frequently than *S. distincta* (Macan, 1954). In the Killarney lakes *S.*

dorsalis was found to be most common in the Lower lake, which is the most productive lake. In the oligotrophic Upper lake the species was largely absent (O'Connor *et al.*, 1986).

31. *Sigara distincta* (Fieber) (Fig. 31)

S. distincta was the second most frequently recorded corixid. The abundance of the species in Ireland has been commented on by Macan (1954), who contrasted it with its absence from similar habitats in Denmark and in Britain.

Records came from all areas of Northern Ireland surveyed and from all habitats. It was recorded from Rathlin Island and in a few upland areas including the Garron plateau, where the highest site for the species was located. However it is predominately a lowland species. Small mesotrophic and mildly eutrophic lakes were the main habitat type occupied though *S. distincta* was also recorded in a few of the large lakes. It was the most frequently recorded corixid in pool habitats. It was found in all the major lowland cutover bog and fen system in the east of the province and several of the Rathlin pools. Reservoir records were few and there was only one record from a river.

Halbert (1935) listed records from throughout Ireland from pools and lakes. The listing in Leston (1958) recorded the species from 23 vice-counties, the second-highest total. The species is clearly one of the commonest and most widespread Irish corixids.

32. *Sigara falleni* (Fieber) (Fig. 32)

S. falleni is one of the main lake species. It is a common species in lowland eutrophic lakes above 1ha in size. 73% of the lake records came from sites over 5ha in area. There was only one recorded site above 200m and few records from other habitats. Whilst records covered most of the province *S. falleni* was noticeably commoner in Co. Fermanagh. There is a puzzling lack of records from the eutrophic lakes in central Co. Down and from the L. Neagh system. Savage (1992) has suggested that *S. falleni* is only found in naturally eutrophic lakes and if this is the case in Northern Ireland it may explain this distribution pattern, as the lakes in the east of the province have been subject to much more artificial enrichment than those in the west.

S. falleni was the most frequently recorded aquatic heteropteran in reservoirs. Records from these accounted for 16% of *S. falleni* records. S+L state that though it flies readily it is a poor coloniser of new sites. This would appear not to be the case in Northern Ireland in view of its

frequency in these predominately artificial sites.

33. *Sigara fallenoidea* Hungerford (Fig. 33)

In a biogeographical sense *S. fallenoidea* is undoubtedly the most interesting species of corixid found in Ireland. Walton first recorded the species in 1936 and described it as a new species *S. pearcei* (Walton, 1936). Subsequently it was found to be conspecific with a Canadian species, *S. fallenoidea*. As well as occurring in Ireland and Canada (where it is rare and found in the prairies), it has also been recorded from Finland and Russia (Jansson, 1986).

The Irish distribution is very distinctive. It is known from the Shannon lakes (Walton, 1936) and also Lower L. Erne (Macan, 1954). Additionally Lansbury (1965) has recorded it from L. Inchiquin, Co. Clare. It has not been recorded from L. Neagh until found in this survey. However it was found to be abundant at two locations in the south-east of L. Neagh and also in L. Beg. The species was also found at three sites on Lower L. Erne. It was not found at any of the sites surveyed on Upper L. Erne.

S. fallenoidea was found in Lower L. Erne on rocky, open shores. On L. Neagh the sites had sandy or stony open shores. It was found in large numbers at all sites. The literature about this species states it is found in calcareous lakes (S+L), which would not hold true for L. Neagh. Its presence here however indicates it is clearly capable of surviving in very eutrophic sites.

34. *Sigara fossarum* (Leach) (Fig. 34)

This is one of the main lake species and it is virtually unknown from other habitat types in Northern Ireland. A record from a flooded quarry in Co. Armagh was the only site which was not a natural lake. The distribution extends over all six counties and to Rathlin Island, but it was most commonly recorded in south-eastern Co. Fermanagh.

The lake sites were varied and the NILS data show no clear pattern. Sites fell equally into the base-poor categories and the mesotrophic/slightly eutrophic categories. Lowland lakes predominate in the records. There are only four of the 20 sites above 100m, with the highest record at 205m. *S. fossarum* was found at sites on Upper L. Erne, L. Beg and Lower L. Macnean.

Both Halbert (1935) and Leston (1958) indicate the species is distributed throughout Ireland. It was not recorded in the recent Killarney studies, though found there in the past (O'Connor *et al.*, 1986). The distribution in Britain shows a mainly southern pattern. It is found in rivers and

lakes here which have some organic matter and non-acidic conditions (S+L).

35. *Sigara scotti* Fieber (Fig. 35)

This corixid was found at scattered sites throughout Northern Ireland, and on Rathlin Island. It is predominately a species of upland base-poor, small lakes but it is also found at lowland sites on cutover bogs where there are deep, clear pools. Records from these bogs account for all sites below 100m. It does not extend to the highest sites as it is absent from lakes above 400m.

Previous studies have shown that *S. scotti* is a species of oligotrophic waters. It shows a significant negative correlation with conductivity in Britain (Savage, 1982). Previous published Irish records of *S. scotti* particularly those from Co. Kerry, show a wider use of habitat than was found in this study. Whilst still a species of oligotrophic waters, it occurs in larger lakes and also at greater altitude. O'Connor *et al.* (1986) found it to be the dominant corixid in the large Killarney lakes except where eutrophication was apparent, and Kirby (1983) recorded it widely in all types of standing water up to 730m.

36. *Sigara lateralis* (Leach) (Fig. 36)

S. lateralis is a brackish water species and is subsequently a coastally-distributed species in Ireland. However in Britain it also occurs inland in grossly eutrophic ponds (S+L). However it cannot tolerate the high salinities favoured by *S. stagnalis* (Savage, 1989) and *S. lateralis* was not recorded at any of the brackish sites which had *S. stagnalis*.

There were four records of this species, though two were from different areas within the Quoile Pondage, Co. Down. Here it was abundant at the brackish end of the impoundment, and was the only species found here. It was taken with freshwater species upstream from this but at much lower abundance. A second record was from a shallow, brackish pool on reclaimed estuarine ground at Belfast Harbour Estate. Here it was found with the saltmarsh beetle *Haliplus apicalis* Thomson. The final record was of a few individuals caught in a moth trap set on the Montiaghs Moss, Co. Antrim. No records of this species has been made in any of the pools at this site, nor at the nearby L. Neagh, so the origin of these individuals is unknown.

37. *Sigara nigrolineata* (Fieber) (Fig. 37)

Adults of this species are amongst the smallest of the *Sigara* species, being only 5 to 6.5mm in length. In Britain it has a disjunct distribution related to its habitat preference (Jansson,

1986; S+L). In the south-east of England, *S. nigrolineata* is a lowland insect found in polluted ponds. In the west and north of Britain it is a species of base-poor pools and small lakes often with *Arctocorisa germari* and *Callicorixa wollastoni*.

Previous Irish records indicate a wide distribution. Halbert (1935) however did not add any comments to the species account in his list. The records in Halbert include sites in sand-dunes, lowland loughs and upland pools. It was also recorded from Clare Island. Leston (1958) added records from five vice-counties to Halbert's list. Kirby (1983) recorded it commonly in the Killarney area in high altitude ponds and loughs.

S. nigrolineata was recorded from 22 sites. The distribution includes all six counties and at sites from sea-level to 470m in the Mournes. It was most commonly taken in shallow peaty pools in upland areas but it was also found in shallow flooded dune slacks and in a pool on reclaimed estuarine land. It was recorded from three very different small lakes, an upland oligotrophic lough, a lowland grossly enriched lake and a marl lake. In Northern Ireland *S. nigrolineata* therefore occupies the full range of habitats in which it has been recorded elsewhere in Ireland and Britain.

38. *Sigara concinna* (Fieber) (Fig. 38)

This species is one of the few which is largely confined to the eastern counties of Northern Ireland. *S. concinna* was recorded from lakes and pools, including several sites on L. Neagh and L. Beg, as well as brackish water sites on the east coast. The single north coast record was from a permanent pool at the edge of a sand dune system.

The L. Neagh area appears to be the centre of its Northern Irish distribution. Most of the L. Neagh records were from the lake itself, but it was also taken in a small artificial lake close to the main lake. It was previously recorded in L. Neagh by Halbert (1935) and again by Macan (1954). Both these records, like the survey records, were from sites on the eastern shore of the lough. Away from L. Neagh and L. Beg, *S. concinna* was recorded on Rathlin Island and at scattered localities in Co. Londonderry, Co. Antrim and Co. Down. The Co. Down records include three brackish coastal sites. The Rathlin site was a heathland pool in the centre of the western arm of the Island. There was also a record of *S. concinna* in considerable numbers in a light trap set on a cutover bog close to the south-east shore of L. Neagh. At the L. Neagh sites *S. concinna* was found with *S. fallenoidea*, and *Arctocorisa germari*, whilst at the coastal

sites it was present with *S. stagnalis* (Leach) or *S. lateralis*.

The sites were predominately lowland and only two sites were not below 30m. The records do suggest that the species can tolerate considerable eutrophication, as in L. Neagh, as well as some degree of salinity as found in the coastal sites. Savage (1986) found that in the north-west Midlands *S. concinna* was a lake species, though local and uncommon. It showed a positive correlation with conductivity. The Northern Irish distribution appears to be in agreement with this.

39. *Sigara semistriata* (Fieber) (Fig. 39)

This small corixid was locally distributed in the province. There were records from 16 sites mostly in Cos Antrim, Armagh and Fermanagh. Small lakes and ponds were the most frequently occupied habitats. In addition there were two records from flooded quarries, both in Co. Armagh. The species occurs particularly in small water-bodies with most sites under 2ha in area. The lakes occupied were included base poor upland lakes and deep marl lakes in south-east Fermanagh.

Elsewhere in Ireland the published records give no indication as to the species habitat preference. *S. semistriata* was not recorded in Killarney by either O'Connor *et al.* (1986) or Kirby (1983, 1991). Halbert (1935) lists records from ten vice-counties throughout Ireland but without making any comment on its status. Additional vice-county records bringing the total up to 18 are shown in Leston (1958). The only additional record available is from Bunduff L., a shallow lake close to the sea in Co. Sligo (pers. obs.).

40. *Sigara stagnalis* (Leach) (Fig. 40)

The distribution of *S. stagnalis* is predominately coastal and the Irish distribution as reported in the main publications indicates a southern distribution with most records south of Dublin on the east coast and Galway on the west (Halbert, 1935; Leston, 1958).

S. stagnalis is found in brackish water and it is the species which can tolerate the highest salinities (S+L; Savage, 1989). There were just two records, both from NILS collections, from Strand L. and Victoria Park, both in Co. Down. There are few sites of this type in Northern Ireland and many of them are artificial (NILS, 1992). The potential distribution of *S. stagnalis* is therefore limited to a restricted number of sites around the major sea loughs and its continued presence is dependant on the maintenance of these areas.

Additional species

There are published records of five other species of aquatic Heteroptera from Northern Ireland, but no records of them were obtained in this survey. *Aphelocheirus aestivalis* (Fabricius) has been recorded from L. Neagh (Halbert, 1935; Bracken, 1974) though it is usually a river species. An unconfirmed report of probably this species from the western shore of L. Neagh has recently been given to the author (R. Anderson, pers. comm.). Records of *Corixa affinis* Leach, *Sigara venusta* (Douglas and Scott), *S. limitata* (Fieber) and *Plea leachi* McGregor and Kirkaldy, all dating from the late 19th or early 20th Century, are all contained in Halbert's original list.

Habitats

The broad habitat classification of the 307 sites is shown in table 1. The small lakes category covers sites larger than 0.25ha up to 250ha, which was the upper size limit used by NILS. The large lakes are those above 250ha, namely L. Neagh, L. Beg, Lower L. Erne, Upper L. Erne and Lower L. Macnean. The ponds category covers small areas of open water below 0.25ha and includes both natural and artificial sites It covers areas such as flooded peat cuttings, natural bog pools and flushes and pools in heathlands. The other categories are reservoirs; rivers and streams (including a few drains and a disused canal); flooded quarries and coastal sites which covers pools in dune systems, saltmarshes and those which were clearly brackish.

1. Small lakes

For the purposes of this study small lakes were arbitrarily defined as areas of open water between 0.25ha and 250ha. This is more restrictive than the definition in Smith *et al.* (1991) which lists all mapped areas of standing water within Northern Ireland as being a lake, but wider than that used in NILS. This only covered lakes above 1ha in area. This obviously includes a large diversity of lakes as well as a 1000 fold size difference. The factors affecting the invertebrate communities within these are probably equally as diverse.

The fauna of small lowland lakes is dominated by corixids, particularly *Callicorixa praeusta*, *Sigara distincta* and *S. falleni*, as well as *Notonecta glauca* and *Nepa cinerea*. Semi-aquatic species are also an important component of the fauna and these lakes are the major habitat of *Gerris argentatus* and *Hydrometra stagnorum*. Amongst the corixids *S. fossarum* is almost totally confined to lakes.

With increasing altitude the lake fauna changes. Some species such as *Glaenocorisa propinqua*, *Callicorixa wollastoni*, and *Sigara scotti* were only found in lakes which are above 200m. Gerrids are very scarce in sites above 200m, presumably due to the more exposed conditions. Instead their place is taken by *Velia caprai*.

2. Large lakes

The community of aquatic Heteroptera found in the large lakes is broadly similar to that in the smaller lakes but two species, *Micronecta poweri* and *Sigara fallenoidea*, are characteristic of lakes of this size. *Arctocorisa germari* was also present in all five of these lakes and can be considered characteristic of them, but it also occurs in other types of lake.

The richest individual lake site in terms of number of species recorded was a small a mesotrophic lake in central Co. Down (Altnadua) with ten species recorded. A further three sites have records of eight or nine species, but in general most lakes had a low species diversity, dominated by common and widespread species. The only noteworthy records at the 'rich' sites were single ones of *Limnoporus rufoscutellatus* and *Notonecta obliqua*.

3. Ponds

This habitat category includes all water-bodies less than 0.25ha in area. Most of these open water habitats were pools on cutover bogs and fens and upland bog pool systems. A large proportion of these pools are artificial in origin. In total 77 sites were defined as this habitat, which amounts to 25% of the sites surveyed.

Thirty-two species of aquatic Heteroptera were recorded from at least one pond site. The most frequently recorded species were *Notonecta glauca*, *Nepa cinerea* and *Sigara distincta*. However the records from ponds did not constitute the main habitat for these species. This did apply to several species notably *Hesperocorixa castanea* (79% of records), *Sigara nigrolineata* (59%), *Gerris costai* (82%) and *Callicorixa wollastoni* (52%). All the records of *Corixa iberica* were from ponds.

The importance of the cutover bogs for aquatic Coleoptera has been documented in Foster *et al.* (1992). These sites also constitute some of the richest habitats for aquatic Heteroptera. Important sites include Montiaghs Moss, Brackagh Moss, Selshion Moss, Lackan Bog and Derryleckagh Bog. The Montiaghs Moss alone has a species list of 15 species, by far the largest single list from any Northern Irish site. This lowland site is particularly notable for the

presence of *Glaenocorisa propinqua*, otherwise an upland species in Northern Ireland, and the gerrid *Limnoporus rufoscutellatus* which is only recorded from a handful of Irish sites.

The cutover bog pool complexes supported a varied fauna of upland and base-poor species to species typical of more eutrophic sites. *Notonecta obliqua* was found on acidic bog sites in the north and west. *Sigara nigrolineata* is typically found in very shallow peaty pools and runnels in bogs and heaths, whilst *Sigara scotti* was present commonly in deep flooded peat cuttings. *Hesperocorixa castanea* also sometimes was found in these shallow runnels, but was more common in small acid, *Sphagnum*-dominated pools. *Cymatia bonsdorffii* and *Corixa dentipes* were both recorded from many of the major sites, though they are less restricted to this habitat than many of the other species.

Like the upland lakes the pools on the Garron plateau, Co. Antrim, the Sperrin Mountains (Co. Tyrone and Co. Londonderry), and in the Co. Fermanagh uplands are largely natural systems within blanket bogs. In the Mournes and on Rathlin Island and Fair Head, similar pools can be found on the summits of mountains and in rocky depressions. These are all largely ombrotrophic and base-poor. *Callicorixa wollastoni* is the typical species of these pools found in all the above localities. *Glaenocorisa propinqua* has a more restricted distribution, and was found in the Garron pools and also in nearby lakes. *Gerris costai* is the other upland pool specialist recorded from most of the upland areas of Northern Ireland. The Rathlin Island pools are notable for the presence of *Corixa iberica* which also occurs in one pool on the adjacent mainland at Fair Head.

4. Coastal sites

A number of coastal sites were covered. These consisted of large brackish lagoons such as Strand L. and the Quoile Pondage as well as smaller ponds. These brackish sites provide the only Northern Irish records of *Sigara stagnalis* and *S. lateralis*. Small pools found around the coast are an important habitat for *Gerris thoracicus*. *S. concinna* is also a species found in these areas, though not restricted to them.

5. Reservoirs

This is the most species poor habitat which must largley be due to the unproductive and artificial conditions prevailing at these sites. Only *Sigara falleni* was recorded at a high proportion of these sites.

6. Rivers

Relatively few species were also recorded in rivers and only one species, *Velia caprai*, is common and probably ubiquitous. *Aquarius najas* is also a riverine species but was only found at one site. This habitat was, however, not sampled intensively.

7. Quarry ponds

Flooded quarries include pools in stone and sand quarries. The former are usually deep and oligotrophic waters whilst the latter tended to be shallower and more productive. These pools supported in total 19 species with no sites holding more than seven species. The only notable species recorded at these sites was *Hesperocorixa moesta*, which was found once at a sandpit in Co. Down.

Conclusions

This study has been the first comprehensive review of this group in Northern Ireland. It has set a baseline account of the distribution of the group. Further studies will be able to build on this.

One of the main aims of the study was to investigate the fauna of the small lakes in Northern Ireland. The results show that as far as this group is concerned the lakes support a rather uniform fauna throughout the lowlands. As a consequence many of the species show a widespread distribution. A more notable fauna is found in ponds, especially those on cutover bogs and fens. The species diversity of some sites is very high and further confirms the data from other insect group of the importance of these sites (Foster *et al.*, 1992). As with other groups, the Montiaghs Moss, Co. Antrim, stands out as a site of exceptional value.

Several species recorded in Northern Ireland can be considered rare and the populations here represent an important segment of the British and Irish populations. The important species are *Corixa iberica*, *Limnoporus rufoscutellatus*, *Sigara fallenoidea* and *Glaenocorisa propinqua*. The status of others is still unclear and further work is required to investigate them.

The conservation needs of the aquatic Heteroptera largely depend on the maintenance of water quality in sites. The species which are most likely to suffer declines are firstly those of oligotrophic and acidic sites which face the threats of cultural eutrophication and habitat loss. Another threat is the introduction of fish. This is known to have a significant negative impact

on the populations of corixids in particular (Savage, 1989). Whilst many lakes already have fish populations, the artificial stocking of lakes could threaten some populations and at particular threat would be *G. propinqua*.

A second group of species under some threat in Northern Ireland is the relatively small number of species found in coastal ponds and lagoons and in particular *Sigara stagnalis* and *S. lateralis*. Few sites are suitable for these species and many are artificial. Continuing land reclamation around the margins of the major sea-loughs constitute a major threat to these areas.

TABLE 1. Summary of habitat data.

Habitat	**No. of sites**	**No. of species**
Small lakes	144	31
Large lakes	5 (31 sites)	24
Pond	73	32
Reservoirs	15	9
Rivers	21	11
Coastal sites	13	17
Quarry ponds	9	19
Total	307	40

TABLE 2. Occurrence of species in each habitat type.

Species	Total	Large lakes	Small lakes	Reservoirs	Ponds	Rivers	Coastal	Quarry
Noto glau	111	5 (12 sites)	66	0	22	10	3	4
Nepa cine	75	4 (5 sites)	35	0	17	2	0	3
Call prae	61	5 (15 sites)	34	3	3	1	4	1
Siga dist	58	3 (7 sites)	35	3	10	1	0	2
Siga feni	50	3 (9 sites)	28	8	1	2	0	2
Gerr lacu	41	3 (6 sites)	17	0	10	4	2	2
Veli capr	41	2 (3 sites)	11	2	12	11	1	1
Cori punc	38	4 (5 sites)	18	1	9	0	2	3
Gerr odon	38	5	17	0	15	0	0	1
Hydr stag	37	10	18	0	4	3	1	1
Hesp sahl	33	0	16	0	15	0	1	1
Cyma bons	30	3	18	1	8	0		0
Siga dors	30	3 (3 sites)	10	5	6	3	1	1
Siga scot	29	0	19	0	10	0		0
Micr reti	29	6	14	0	9	0		0
Call woll	25	0	12	0	13	0		0
Cori dent	25	4 (4 sites)	18	0	3	0		0
Hesp linn	23	2 (2 sites)	8	0	11	0	1	1
Gerr arge	23	2 (1 site)	17	0	3	0		1
Siga nigr	22	0	3	0	13	0	3	3
Arct germ	21	4 (7 sites)	11	2	1	0		0
Siga foss	20	3 (4 sites)	15	0	0	0		1
Hesp cast	19	0	4	0	15	0		0
Gerr thor	18	3 (1 site)	0	0	4	0	8	3
Siga semi	17	1 (1 site)	10	0	4	0		2
Siga conc	14	2 (4 sites)	4	0	2	0	3	0
Gerr cost	11	0	0	0	9	0	2	0
Micr powe	8	4 (6 sites)	1	0	0	1	0	0
Noto obli	7	0	3	0	4	0	0	0
Glae prop	7	0	5	0	2	0	0	0
Siga fdea	7	3 (7 sites)	0	0	0	0	0	0
Gerr late	7	0	2	0	4	0	1	0
Cori iber	5	0	0	0	5	0	0	0
Limn rufo	4	1	1	0	2	0	0	0
Siga late	4	0	1	0	0	0	2	0
Hebr rufi	3	na	na	na	na	na	na	na
Cori panz	2	0	0	1	0	0	1	0
Siga stag	2	0	0	0	0	0	2	0
Hesp moes	1	0	0	0	0	0	0	1
Aqua naja	1	0	0	0	0	1	0	0

1. *Sigara concinna*, *S. dorsalis* and *S. lateralis* were all recorded at one locality in light trap.
2. *Hebrus ruficeps* was recorded at three sites, all in moss carpets.

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APPENDIX 1. Lists of sites sampled and species recorded.

Abbreviations: Hab= Habitat; LL= Large Lakes >250ha; Lakes= Small lakes 0.25ha-250ha; RE= Reservoirs; P= Ponds; R=Rivers, streams, drains and canals; CO=Coastal lagoons and ponds; QP=Quarry Ponds.

GRID REF.	NAME	RECORDER NUMBER	HAB	SPECIES
FERMANAGH H33 108 sites				
G9352	Lough Melvin	2073	LL	16
G9860	Lough Keenaghan	808	L	8, 9, 26, 31
H0834	Legalough	151/2	L	2, 8, 9, 13, 39
H0938	Lower Lough Macnean	811	LL	2, 13, 14, 19, 29, 30, 31, 32, 34
H0549	Meenloughabank	30/2	P	13
H0743	Lough Alaban	1133	L	3, 10, 14, 15, 22, 25, 31,35
H0843	Ballintempo	2083	P	26, 31
H0356	Glencreawan Lough	544	L	30
H0350	Lough Nabrickboy	699	L	9, 13
H0454	Braade	813	P	12, 26
H0656	Letter (Shean) Lough	163	L	14, 19, 22, 39
H0753	Largalinny Lough	815	L	9, 14, 27, 26, 35
H0853	Monawilkin Lough	814	L	3, 9, 14, 21, 31
H0061	Lough Scolban	819	L	13, 14
H0260	Castlecaldwell, L.L.Erne	13011	LL	13, 32, 33
H0461	Lough A Waddy	818	L	2, 3, 14, 30, 35
H0664	Tullyvocady Lough	817	L	2, 8, 9, 14, 16, 32
H1053	Tonnagh Quarry	13023	QP	13
H1129	Lough Atona	821/2	L	3, 14, 18, 20, 29
H1429	Cuilcagh pool system	821/1	P	20
H1238	Lower Lough Macnean	823	LL	3, 16, 32
H1330	Gortmaconnell	821/4	P	4, 5, 14, 20
H1431	Polasumera River	821/5	R	3, 14
H1532	Lough Aleim	821/3/1	P	10, 14, 20, 27
H1531	Trien	821/3/2	P	20
H1730	Gortalughany	1894	R	3
H1938	Five Points Bog	1896	P	26, 37
H1346	Ross Lough	830	L	32
H1347	Carran Lough	829	L	30, 31, 32
H1651	Camagh Bay, L.L.Erne	831	LL	13, 19, 21, 31, 33
H1752	Carrickreagh quarry	13006	QP	7, 9
H1752	Carrickreagh, L.L. Erne	13006	LL	19, 29
H1750	Green Lough	2075	L	8, 13, 22

H1856	Rossgweer Bog	126	P	27
H1365	Bannagh R., Lwr L. Erne	833	LL	2, 3, 4, 8, 9, 10, 14, 16, 19, 22, 32
H2035	Drumanacabanagher	920	P	14
H2434	Corracoash Lough	919	L	4, 13, 14
H2438	Mill Lough	915	L	2, 4, 13, 17, 19, 21
H2535	Rossdoney Quay	591	LL	32, 34
H2635	Lough Derg	917	L	21, 22, 32
H2543	Breandrum Lough	596	L	14
H2060	Lough Bresk	925	L	13
H2736	Lough Barry	580	L	13, 14, 19, 21, 31, 32
H2831	Knockninny, U. L. Erne	916	LL	14, 19, 22, 32
H2836	Inishmore, U.L.Erne	3256/1	LL	4, 13, 14
H2933	Inishcreenry, U. L. Erne	918	LL	2, 4, 10, 13, 14, 17, 19, 22, 31, 32
H2248	Trory, L. L. Erne	924	LL	14, 19, 33
H2541	Lough Acrussel	922	L	14
H2543	Lough Coole	597	L	17, 22
H2847	Ballydoolagh Lough	921	L	14, 19, 21. 22, 31, 32
H2561	Raw Lough	617	L	4, 13, 14, 31, 39
H3021	Moninea Bog	3008	P	3, 13
H3028	Drummully Lough	3194	L	2, 8, 9, 10, 13, 17, 31
H3029	Tiraroe, Upp. L. Erne	301	LL	2, 4, 7, 9, 10, 12, 13, 14, 17, 31, 34, 39
H3129	Inishcrevan, U.L.Erne	3074	LL	2, 9, 14, 21
H3220	Killymackan Lough	302	L	4, 14, 21, 31
H3325	Abacon Lough	938	L	2, 13, 14, 32
H3321	Mill Lough	934	L	13, 14
H3329	Trannish, U. L.Erne	13257	LL	2, 7, 10, 13, 16, 17, 19, 31
H3427	Upper L. Erne Derrylea	3224	LL	4, 31
H3429	Lough Doo	3204	L	4, 8, 9, 10, 13, 14
H3524	Crom, Upper Lough Erne	620	LL	10, 16
H3523	Corlatt, Upper L. Erne	941	LL	31, 32
H3522	Corraharra Lough	939	L	13, 14, 32
H3529	Gortgranagh	933	P	14
H3524	Inisherk, Upper L. Erne	932	LL	2, 13
H3624	"Green Bottoms" Crom	940	P	14, 31, 30, 32
H3624	Lough Nalughoge	936	L	13
H3625	Rossdill Lough ditch	1907	D	9, 13, 14
H3625	Derrymacrow Lough	929	L	13, 21, 32
H3626	Friar's Lough	928	L	13, 31, 34
H3723	Inishfendra, Upp. L. Erne	931	LL	2
H3821	Upp L. Erne, Galloon	13264	LL	2, 8, 9, 13, 14, 16, 19, 32
H3926	Lehinch Lough	935	L	13
H3233	Lough Digh	943	L	10, 34
H3532	Lough Head drain	390	D	14
H3533	Drumroosk	13255	P	7, 9, 26,39

H3830	Moorlough	1908	L	13, 14, 19
H3936	Lough Napeasta	702	L	13
H3933	Lough Narye	944	L	2, 14, 31, 32, 34
H3049	Watson's Lough	945	L	13, 14, 19, 22, 34
H3044	Lough Skale	948	L	14, 22
H3045	Topped Mountain Lake	946	L	8, 9, 13, 14, 19, 31, 32
H3243	Lough Eyes	947	L	10, 31, 34
H3250	Lough Mulshane	949	L	2
H4020	Derrykerrib Lough	955	L	13, 14
H4122	Kilgarrow Lough	953	L	21
H4123	Lough Nacallagh	958	L	32
H4223	Aghnahinch Lough	957	L	32
H4229	Kilmacbrack Lough	954	L	19, 31, 32
H4720	Finn Floods	3076	D	30, 32
H4726	Knockballymore Lough	735	L	4, 9, 10, 14, 34, 39
H4927	Kilroosky Lough fen	3000	P	1, 4, 6, 8, 9, 13, 17, 22, 25, 26
H4928	Summerhill Lough	4094	L	4, 14, 37, 39
H4928	Burdautien Lough	3134	L	4, 14, 39
H4928	Burdautien Lough fen	3134	P	6, 9, 13, 26
H4730	Cornagague Lough	736	L	13
H4733	Corranny Lough	961	L	8, 30, 34
H4737	Lough Nabull	960	L	2, 14, 19, 22, 31, 39
H4833	Lough Cushkeery	703	L	13, 19, 29
H4840	Jenkin Lough	962	L	19, 35
H4840	Black Lough	659	L	19
H5130	Cromaghy Lough	963	L	13, 19, 30, 31
H5130	Annachullion Lough	4088	L	8, 9, 17
H5231	Inver Lough	964	L	8, 1, 143, 14
H5430	Islandhill Lough	4086	L	9, 14, 25
H5432	Drumacrittin Lough	3136	L	1, 2, 4, 13, 14, 17, 32
H5533	Kilyvilly Lough	4075	L	8, 14, 32

TYRONE H36 32 sites

H0881	Lough Bradan	820	L	19
H2263	Crockanaver Quarry	926	QP	30, 31, 32
H2074	Loughdoo	1963/1	L	3, 14, 19
H2684	River Derg,Castlederg	10274/1	R	2, 9, 16, 30
H3079	Drumgallan Bog	2195	P	13
H3274	Drumquin Lough	951	L	17, 32, 34
H3576	Claraghmore Lough	950	L	2, 4, 12, 13, 14, 30, 31, 34
H3684	Lough Catherine	952	L	14, 32
H4984	New Lough	13012	L	13, 35
H5343	Lough Sallagh	3847	L	3, 18
H5344	Pools Slieve Beagh	440/1	P	3, 20, 37
H5444	Loughanalbanagh	3848	L	20, 29

H5444	Lough Eshbrick	440/3	L	3, 17, 20, 35
H5444	Glenbower Lough	3849	L	3, 20, 35
H5544	Lough Navarad	3863	L	19, 26, 35
H5644	Lough na heery	965	L	35
H5849	Carrickavoy Lough	210	L	17
H5050	Annagh Lough	966	L	14, 21
H5678	Loughnacree	967	L	15
H6954	Carnteel Lough	968	L	8, 10, 13, 19, 21, 32
H6778	Loughaslane	969	L	17, 19
H6394	Glenelly River	13321	R	3
H7359	Mullaghbane Moss	973	L	2, 4, 14, 19, 21
H7255	Carrick Lough	972	L	2, 8, 9, 14, 17, 19, 31, 34
H7352	Legane Lough	1922	L	4, 14, 19, 21, 26
H7388	Teal Lough	737	P	5, 10, 20, 27, 37
H8152	R. Blackwater, Benburb	981	R	2, 11, 14
H8268	Roughan Lough	983	L	21, 31
H9472	Blacker's Rock, bog	13015	P	6, 26
H9472	Blacker's Rock, L Neagh	996	LL	4, 13, 14, 19, 22, 25
H9573	Kiltagh Point, L. Neagh	995	LL	29, 19
H9679	Curran, Lough Neagh	994	LL	29

ARMAGH H36 33 sites

H7539	Tullybrick Lough	970	L	14, 17, 21
H8815	Lough Ross	974	L	14
H8128	Drumnahavil	975	P	4, 10, 13, 14, 17, 21, 25, 31, 35
H8629	Tullynawood Lough	976	L	32
H8230	Straghan's Lough	977	L	14
H8731	Augnagurgan Lough	978	L	2, 10, 14, 31, 34
H8346	Lisadian quarry	13007	QP	8, 14, 19, 25, 32, 34, 39
H8545	Loughnashade	1926	L	17
H8743	Rocks Quarry	13008	QP	22, 26
H8657	Argory Ditches	1273/2	D	9
H8757	Argory Moss	1273/3	P	9
H8658	Blackwater River	13010	R	14, 32
H9916	Mullaghbane South	2210	P	10, 27, 30
H9835	Gibson's Lough	986	L	14, 32
H9241	Edenknappagh	988	L	10, 13, 14, 19, 22, 31
H9844	Marlacoo Lake	987	L	13, 14, 19, 21, 29, 32
H9854	Selshion quarry	13009	QP	2, 7, 14, 37, 39
H9854	Selshion Moss	989	P	4, 10, 13, 14, 17, 31, 35
H9060	Peatlands Park B	984	P	4, 7, 14, 22, 26
H9263	Maghery Canal	1932	C	14
H9263	Maghery, Lough Neagh	1933	LL	2, 3, 13
H9561	Derrylard	1931	L	2, 10, 14, 25, 30, 32, 39
H9662	River Bann, Bannfoot	991	R	14

J0156	Derryvore	1665	P	10, 13, 14, 25
J0251	Brackagh Bog	2255	P	2, 6, 13, 14, 17, 21, 25, 26, 27, 31
J0351	Newry Canal	872	C	2, 13, 14, 19, 30
J0558	Craigavon North Lake	874	L	13
J0958	Lurgan Park Lake	873	L	14, 19, 32
J0462	Closet Bay	880	LL	30, 33, 38
J0461	Closet River	879	LL	19, 21, 33
J0561	Kinnegoe Bay, L. Neagh	882	LL	19, 29, 38
J0560	Turmoyra Marsh	878	P	14, 30
J0661	Kinnegoe Pond	876	L	10, 13, 14, 19, 22, 30, 31, 32, 38
DOWN H38 74 sites				
J0644	Scarva Lough	2213	L	14, 22, 37
J1125	Derryleckagh	2292/2/1	P	1, 2, 4, 10, 13, 14, 17, 25, 31, 35, 39
J1123	Greenan Lough	884	L	25, 26, 31, 34, 38
J1221	Mill Pond	883	L	22
J1932	Lough Drum	886	L	31
J1141	Lough Brickland	1628	L	2, 8, 9, 13, 14, 19, 29, 32
J1849	Skillyscolban Lough	778	L	6, 10, 13, 14, 22
J2615	White Water River	10061	R	3
J2616	Tullyframe sandpit	887	QP	7, 10, 13, 14, 28, 31
J2121	Kilbroney Red Bog	3736	L	3, 4, 10, 14, 20, 26, 27, 29, 35
J2148	Gall Bog	1521	P	2, 3, 10, 13, 25
J2222	Yellow Water valley	13246	F	3, 5
J2225	Leitrim Lodge	1639	F	3, 5, 27
J2424	Hen Mountain Pond	13013	P	5, 22, 37
J2625	Deer's Meadow, Spelga	2193	P	27, 37
J2827	Ott Mountain flushes	13248	F	3
J2926	Lough Shannagh	2429	L	18, 29
J2926	Doan Mtn. pools	13253	P	20, 37
J2337	Lackan Bog	1642/2	P	4, 10, 14, 17, 22, 25, 26, 27, 31
J2953	Lough Aghery	889	L	8, 13, 14, 17, 19
J3021	Sally L., Silent Valley	5065/2	L	9, 17, 35
J3021	Quarry Pond, Ballinran	5065/1	P	3, 26
J3027	Blue Lough	13247	P	8, 14, 20, 29, 37
J3224	Binnian Lough	3738	L	20, 26
J3224	Slieve Binnian flushes	13249	F	7, 20, 27, 37
J3225	Blue Lough	891/1	L	20, 27, 29
J3623	Round Seefin pools		P	3, 5, 37
J3826	Bloody Bridge Valley	786	F	2, 3
J3826	Bloody Bridge path	786	CO	3, 7
J3130	Trassey flushes	13266/1	F	10, 27, 37
J3134	Altnadua Lough	1591	L	2, 4, 9, 10, 14, 25, 26, 30, 31, 34
J3237	Cypress Pond	893	L	19, 35

J3237	Mountain Lake	892	L	13, 27, 35
J3934	Dundrum Bay ditch	11005	P	26
J3934	Carrigs River	2263/3	R	3, 14
J3545	Dunmore Fen	1939	P	13, 15, 25, 35
J3553	Ballykine Loughs	1945	L	8, 17, 19, 21, 26, 31, 34
J3755	The Long Lough	894	L	31
J3168	Edenderry	2120	P	10, 13, 25, 30
J3268	R. Lagan, Barnetts Pk	2118	R	9, 31
J3964	Monlough	1946	L	2, 10
J3675	Victoria Park Lake	896	CO	14, 22, 38, 40
J3878	Sydenham Pools	10004/3	CO	6, 7, 36, 37
J4139	Ardilea pond	2263/3/4	CO	14, 19, 38
J4236	Ballykinler	2263/3/6	CO	7, 19
J4239	Blackstuff Estuary	2263/3/5	CO	7
J4748	Ballyvarnet Reservoir	905	RE	30, 31
J4947	Quoile Pondage	2257/14	L	14, 22, 36, 38
J4459	Aughnadarragh Lough	1604	L	17, 21, 26, 29, 34
J4756	Derryboy Lough	902	L	19
J4850	Turmenan	1948	P	9, 22, 26
J4852	Carnalea		CO	7
J4852	Cluntagh	901	P	8, 10, 13, 14, 17, 22, 38
J4958	Heron Lough	1950	L	8, 9, 10, 19, 25, 26
J4763	Tullynagee Lough	1610	L	21,31
J4967	Castle Espie	1951	L	31
J4967	Castle Espie saltmarsh	4517	CO	7
J4177	Hollywood Low Res	3624	RE	30
J4278	Creighton's Green Res	906	RE	19, 32
J5237	Killough Reservoir	2201	RE	24, 32
J5048	Quoile Pondage	2257/14	CO	36
J5144	Struell	1954	P	3, 9
J5345	Lough Money	910	L	13, 14, 31, 32
J5337	Strand Lough	907	CO	14, 40
J5549	Mallard Ponds	909	P	14, 22
J5645	Lough Keelan	1617	L	22, 25, 31
J5647	Tullyrathy Dam	2214	L	6, 14, 22, 26
J5055	Clea Lakes	1619	L	14, 17, 19, 22, 31
J5058	Carrigullian Lough	1618	L	14, 17
J5952	Ballyherly Lough	1962	L	32
J5582	Portavo Reservoir	3618	RE	29
J6154	Ballyfinragh Lough	2185	L	19, 30
J6155	Lough Doo	3675	L	19
J6363	Glastry	914	L	10, 13, 14, 25

ANTRIM H39 44 sites

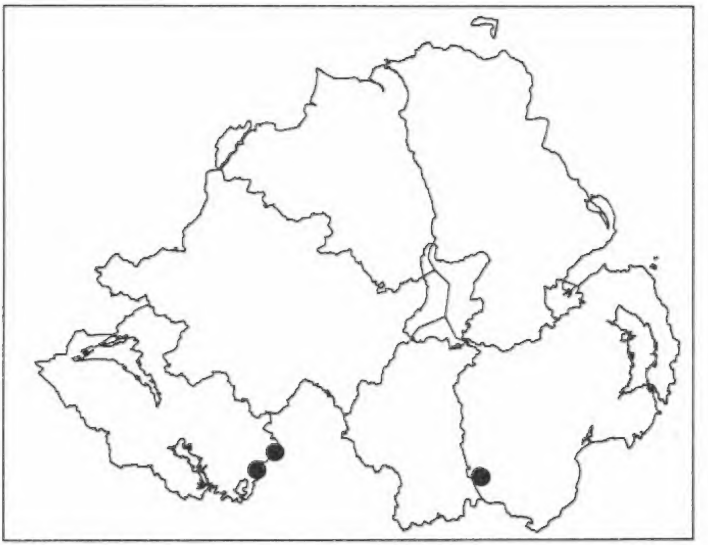
J0765	Bartins's Bay, L. Neagh	881	LL	33
J0965	Montiaghs Moss	2209	P	9, 10, 12, 13, 14, 17, 18, 19, 21, 25, 26, 27, 31, 35, 39. [30, 36, 38 at light only]
J1485	Rea's Wood pond	223/3	P	4, 10, 13, 14, 30
J1485	Rea's Wood, L. Neagh	223/1	LL	9, 14, 19, 29, 38
J2169	Stoneyford Reservoir	2285/2	RE	19, 32
J2267	Belshaw's Quarry	705	R	3
J2172	Leathemstown Reservoir	3533	RE	3, 19
J2172	Rushyhill River	13243	R	3
J2571	Slievenacloy stream	13244/2	R	3
J2881	Hydepark Dam	890	RE	31, 32
J3666	Knockbreckan Reservoir	895	RE	30
J3788	South Woodburn Res. B	13003	RE	30, 32
J3789	South Woodburn Res. C	897	RE	32
J3392	Straid Reservoir	898	RE	22, 29, 30, 31, 32
J4498	Magheramorne	13263	P	7, 14
D0244	White Park Bay	1573	CO	5, 37
D1918	Loughnaweelan	838	L	14, 18, 26, 20
D1842	Pool, Fair Head	2273/1	P	37
D1842	Lough Fadden	2273/2/2	L	5, 14, 15, 20, 23, 26, 35, 39
D1844	Pool, Fair Head	2273/1/1	P	20
D1152	Lough Nanskan	2267/14	L	31
D1152	Ballygill Pond 1	2267/11/1/1	P	19
D1152	Ballygill Pond 2	2267/11/1/2	P	30, 35
D1252	Ballygill Pond 3	2267/11/1/3	P	31, 35
D1251	Knockans pool	2267/12/1/1	P	19, 23, 31
D1251	Knockans pool	2267/12/1/2	P	23, 38
D1551	East Light Pool 1	856	P	15
D1551	East Light Pool 2	2267/13/1/1	P	23, 35
D1551	East Light Pool 3	2267/13/1/2	P	14, 23
D1742	Lough na Cranagh	840	L	3, 13, 26, 35
D1817	Dungonnel Reservoir	3514	RE	3
D1918	Evish Lough	1577	P	22, 20, 26
D2219	Upp Glenariff Mtn west	2287/2/1	L	18, 20, 26, 29
D2319	Upp Glenarrif Mtn west	2287/2/3/2	L	37
D2319	Pools, Garron Plateau	2287/6	P	18, 20
D2419	Pool Lemnalary mtn	2287/10	P	14, 35
D2519	Pollan Burn	13004	R	3
D2519	Loughisland	865	L	35
D2519	Lough Fad	2287/7	L	35
D2619	Pool, Lemnalary	2287/10	P	14, 35
D2719	Lough Natrosk	1884	L	29, 31, 35, 39
D2620	Lough, Lemnalary Mtn	2287/9/1	L	13, 31, 35

D3501	Kilwaughter	867	L	38
C9429	Garry Bog	112	P	9, 13, 15, 27, 37, 39
DERRY H40 16 sites				
H7488	Mill Lough	3807	L	3, 20
H7489	Stone Hill sandworkings	13254	QP	9, 22, 37
H7093	Lough Ouske	3806	L	14, 20
H7093	Lough Ouske bog	3806/1	P	5
H8698	Ballynahone Bog	516	P	3, 9, 27, 37
H8795	Curran Bog	13014	P	4, 9, 10, 14, 15, 22, 25, 27
H9689	Moyola Water A	997	RE	17
H9794	Lough Beg	998	LL	7, 9, 14, 19, 21, 22, 25, 29, 30, 33, 34, 38
C5223	Donnybrewer Level	1857	CO	2, 9, 7, 25, 19
C5822	Faughanvale River	13250	R	3
C6705	Owenrigh River	2277/1/2	R	3
C7835	Ballywoolen pool	2186	CO	19, 22, 24, 30
C7235	The Umbra	2282	CO	5, 9, 7, 26, 38, 37
C7000	Glenedra Bridge	13251	P	3, 5, 20, 27
C7299	Kilcraigagh	13252	QP	3, 14, 22, 37
C8704	New Dam, Upperlands	834	RE	32

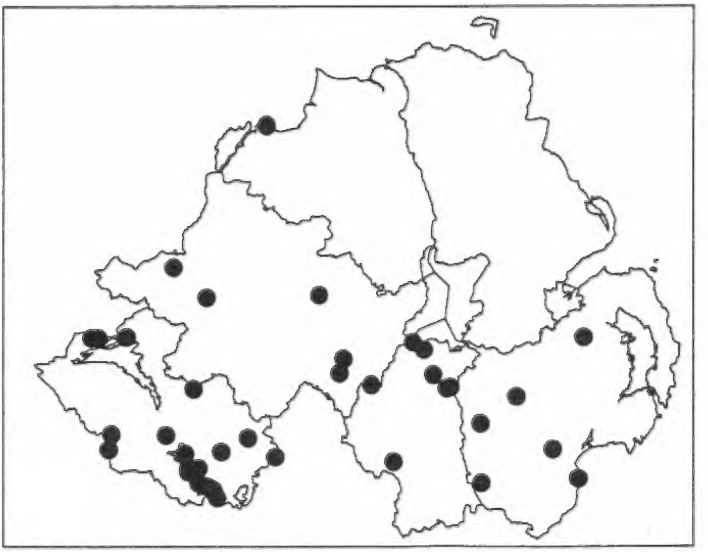
APPENDIX 2. Checklist of the Irish aquatic Heteroptera.
The nomenclature follows Savage (1989).

HEBRIDAE
Hebrus ruficeps (Thomson)
HYDROMETRIDAE
Hydrometra stagnorum (Linnaeus)
VELIIDAE
Velia caprai Tamanini
Velia saulii Tamanini
Microvelia reticulata (Burmeister)
Microvelia pygmaea (Dufour)
GERRIDAE
Gerris costai (Herrich-Schaeffer)
Gerris lateralis Schummel
Gerris thoracicus Schummel
Gerris argentatus Schummel
Gerris lacustris (Linnaeus)
Gerris odontogaster (Zetterstedt)
Aquarius najas (DeGeer)
Limnoporus rufoscutellatus Latreille
NEPIDAE
Nepa cinerea Linnaeus
APHELOCHEIRIDAE
Aphelocheirus aestivalis (Fabricius)
NOTONECTIDAE
Notonecta glauca Linnaeus
Notonecta marmorea Fabricius
Notonecta obliqua Gallen
Notonecta maculata Fabricius
PLEIDAE
Plea leachi McGregor and Kirkaldy
CORIXIDAE
Micronecta poweri (Douglas and Scott)
Cymatia bonsdorffii (Sahlberg)
Glaenocorisa propinqua (Fieber)
Callicorixa praeusta (Fieber)
Callicorixa wollastoni (Douglas and Scott)
Corixa dentipes (Thomson)
Corixa punctata (Illinger)
Corixa iberica Jansson
Corixa affinis Leach
Corixa panzeri (Fieber)
Hesperocorixa linnaei (Fieber)
Hesperocorixa sahlbergi (Fieber)
Hesperocorixa castanea (Thomson)
Hesperocorixa moesta (Fieber)
Arctocorisa germari (Fieber)
Sigara dorsalis (Leach)
Sigara distincta (Fieber)
Sigara falleni (Fieber)
Sigara fallenoidea (Hungerford)
Sigara fossarum (Leach)
Sigara scotti (Fieber)
Sigara lateralis (Leach)
Sigara nigrolineata (Fieber)
Sigara concinna (Fieber)
Sigara limitata (Fieber)
Sigara semistriata (Fieber)
Sigara venusta (Douglas and Scott)
Sigara selecta (Fieber)
Sigara stagnalis (Leach)

FIGURES 1-2: distribution maps of *Hebrus ruficeps* and *Hydrometra stagnorum*.

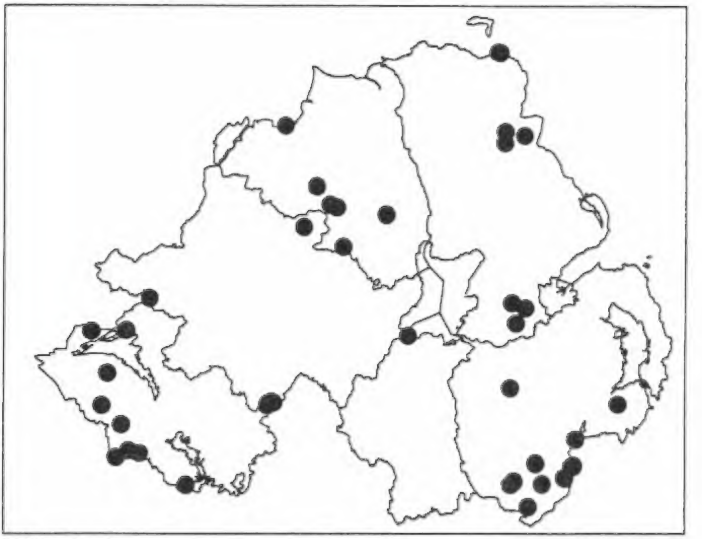


Hebrus ruficeps

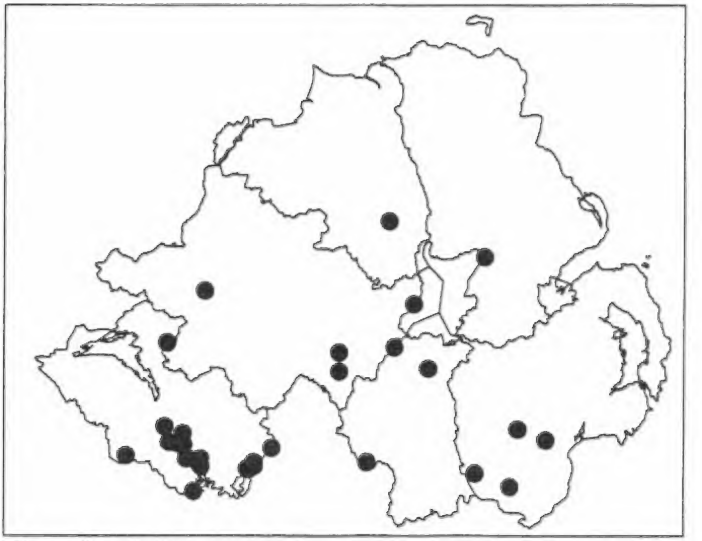


Hydrometra stagnorum

FIGURES 3-4: distribution maps of *Velia caprai* and *Microvelia reticulata*.

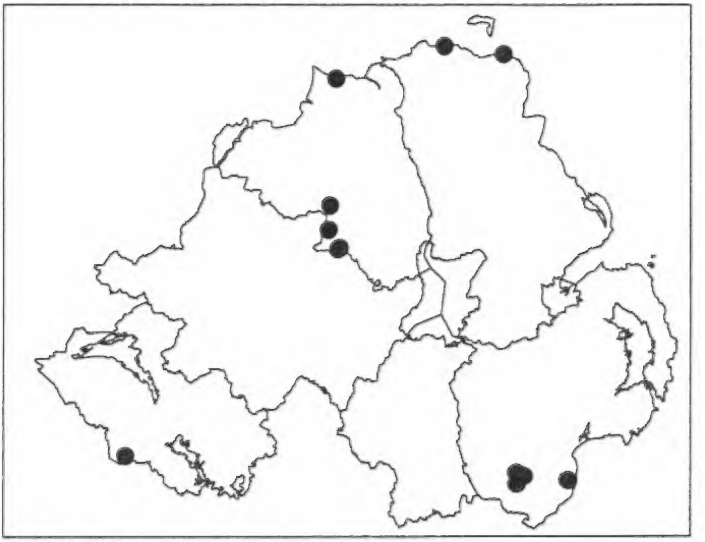


Velia caprai

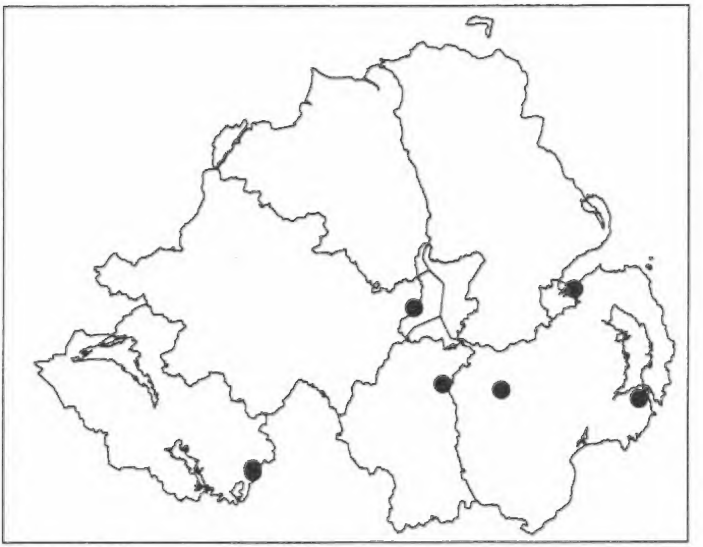


Microvelia reticulata

FIGURES 5-6: distribution maps of *Gerris costai* and *G. lateralis*.

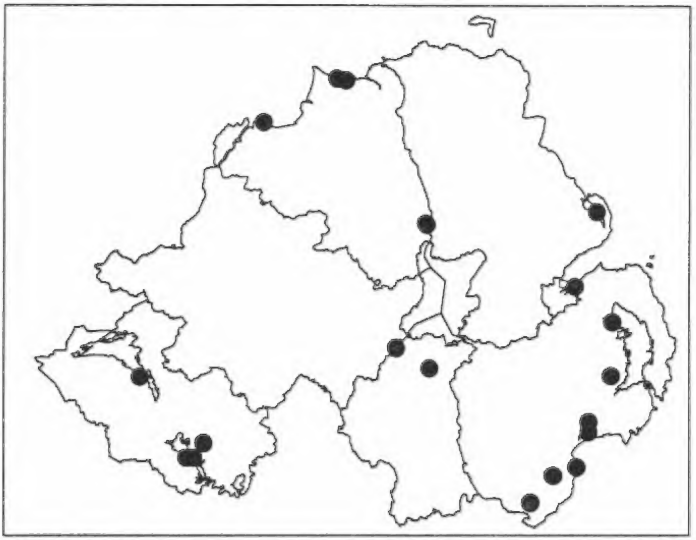


Gerris costai

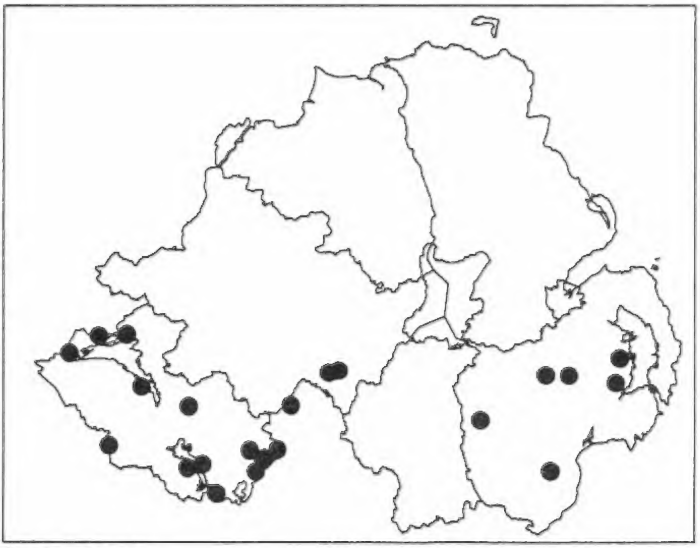


Gerris lateralis

FIGURES 7-8: distribution maps of *Gerris thoracicus* and *G. argentatus*.

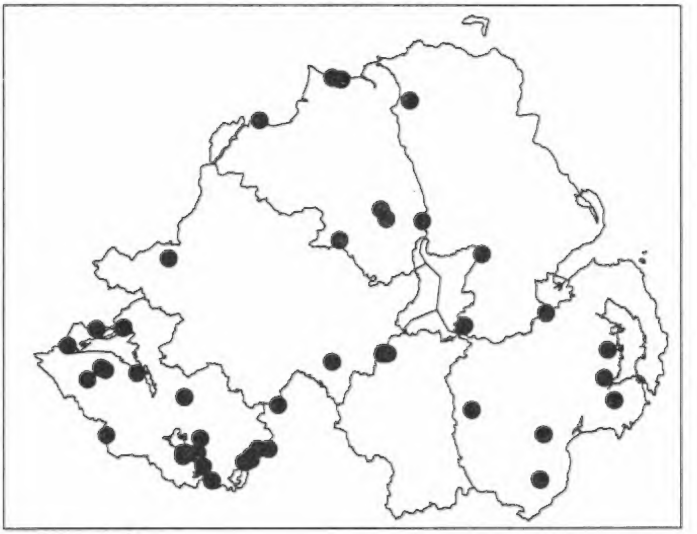


Gerris thoracicus

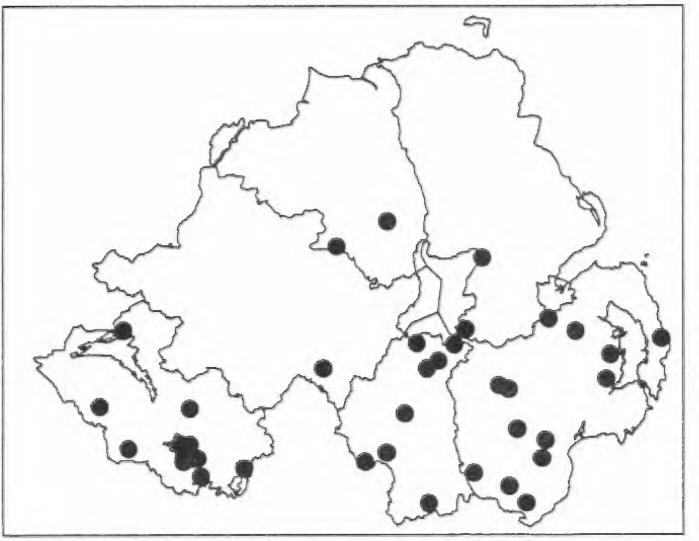


Gerris argentatus

FIGURES 9-10: distribution maps of *Gerris lacustris* and *G. odontogaster*.

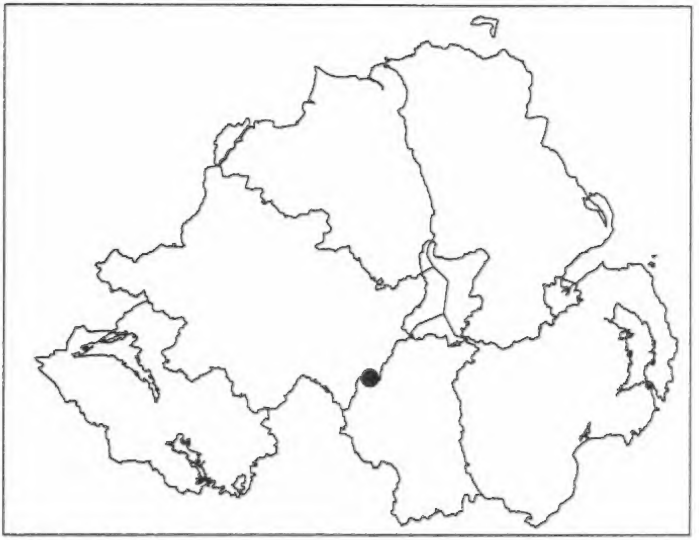


Gerris lacustris

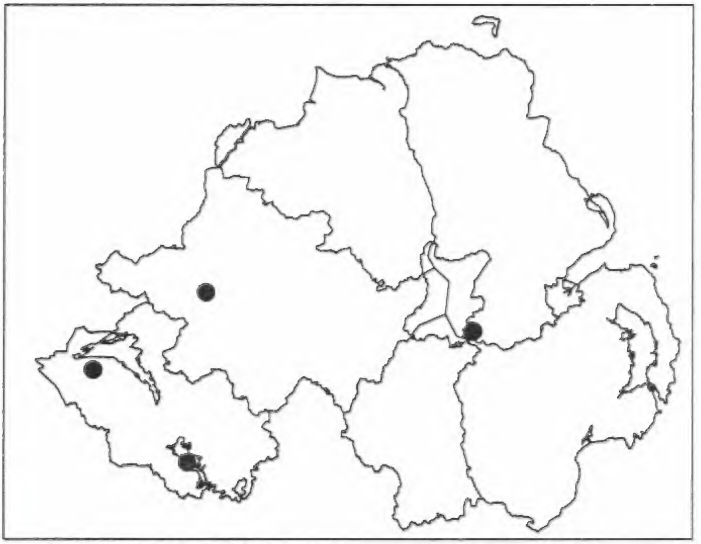


Gerris odontogaster

FIGURES 11-12: distribution maps of *Aquarius najas* and *Limnoporus rufoscutellatus*.

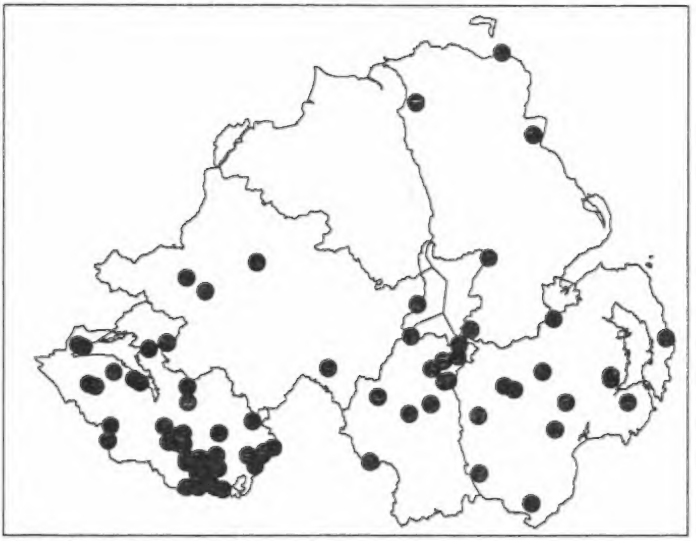


Aquarius najas

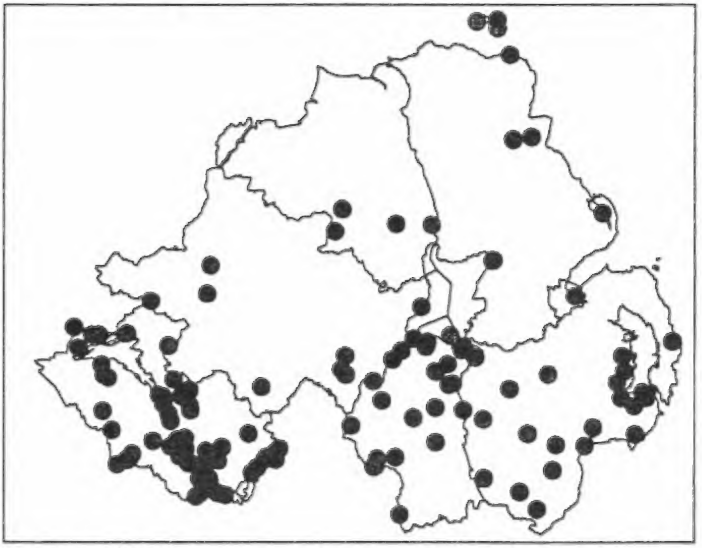


Limnoporus rufoscutellatus

FIGURES 13-14: distribution maps of *Nepa cinerea* and *Notonecta glauca*.

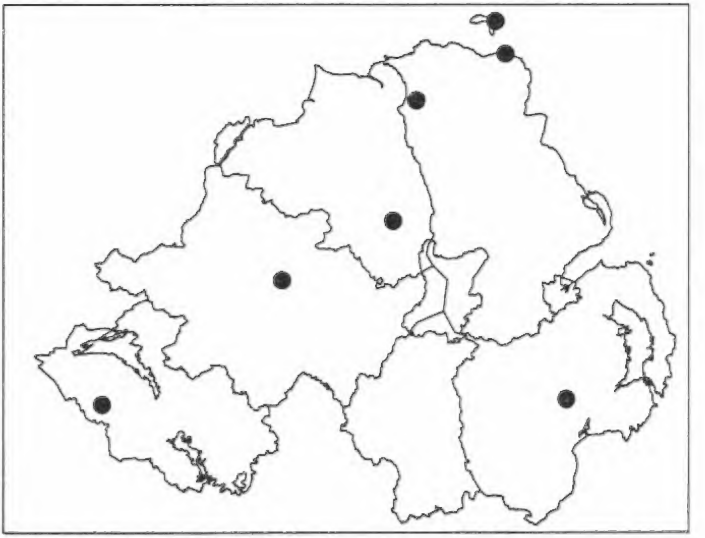


Nepa cinerea

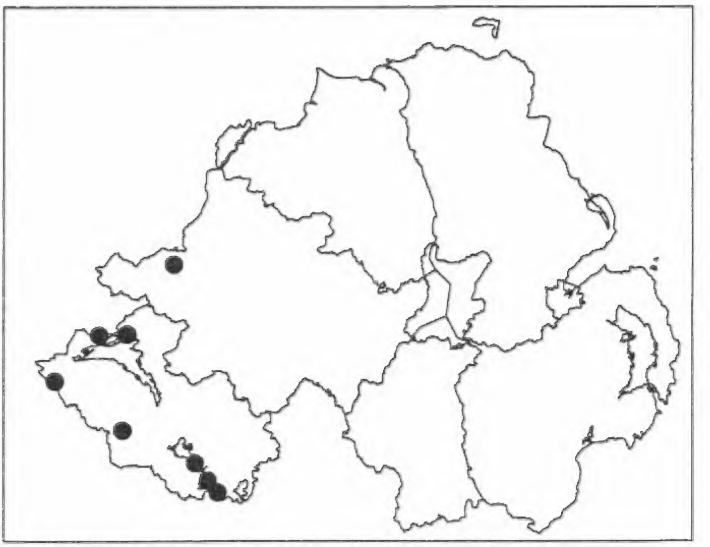


Notonecta glauca

FIGURES 15-16: distribution maps of *Notonecta obliqua* and *Micronecta poweri*.

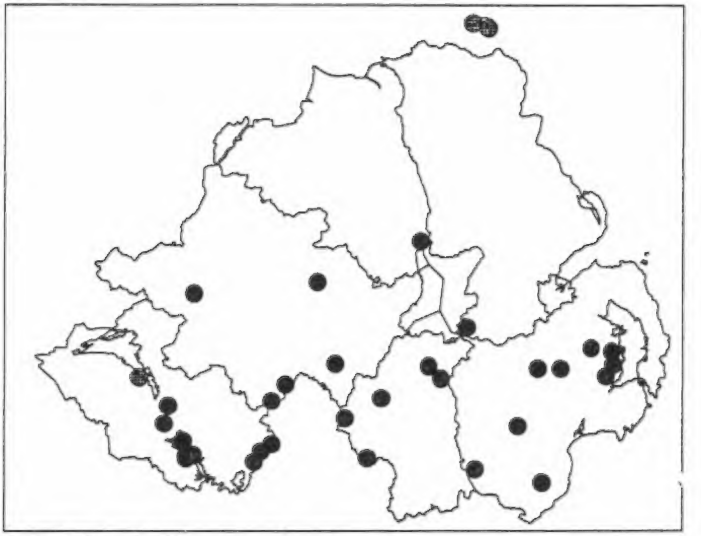


Notonecta obliqua

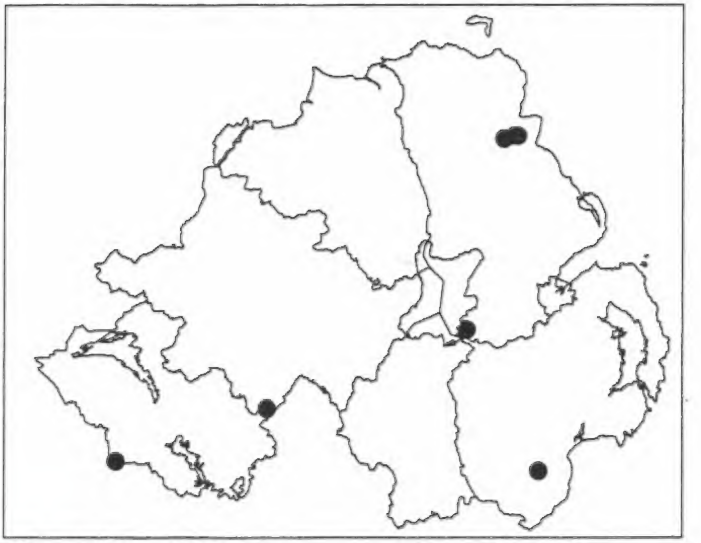


Micronecta poweri

FIGURES 17-18: distribution maps of *Cymatia bonsdorffii* and *Glaenocorisa propinqua*.

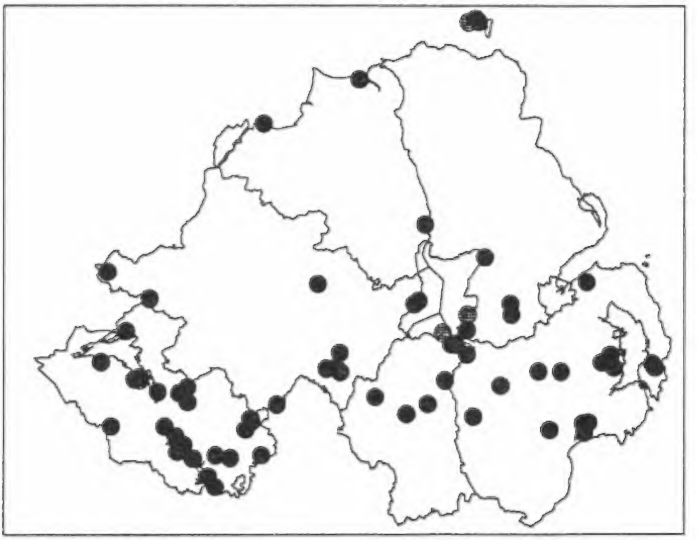


Cymatia bonsdorffii

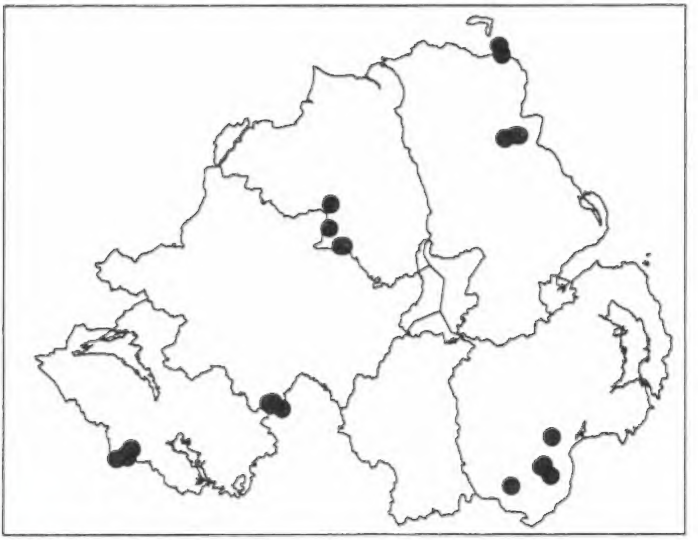


Glaenocorisa propinqua

FIGURES 19-20: distribution maps of *Callicorixa praeusta* and *C. wollastoni*.

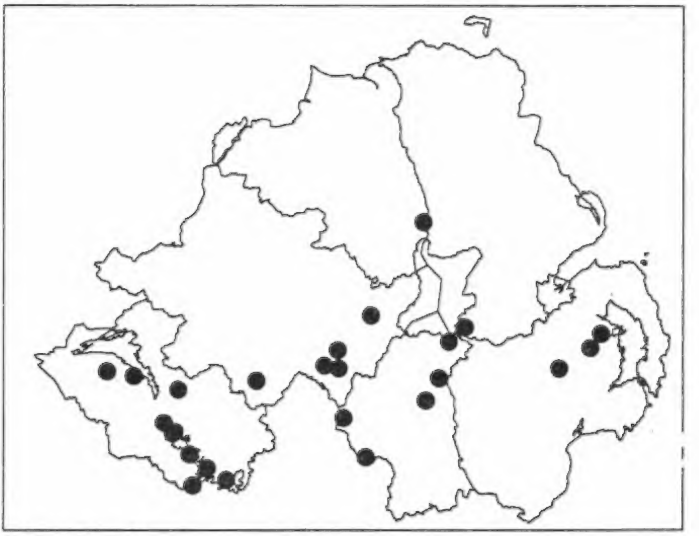


Callicorixa praeusta

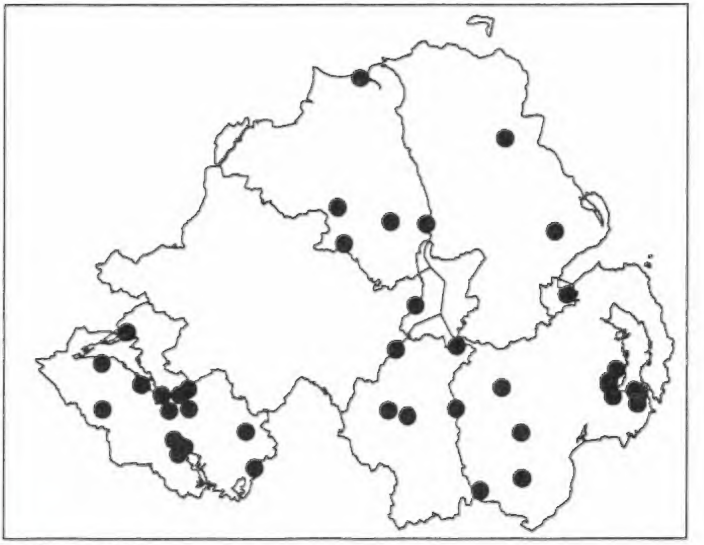


Callicorixa wollastoni

FIGURES 21-22: distribution maps of *Corixa dentipes* and *C. punctata*.

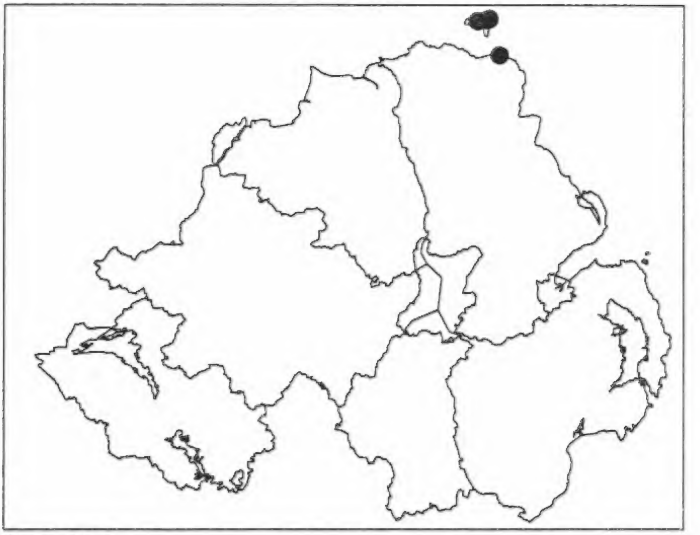


Corixa dentipes

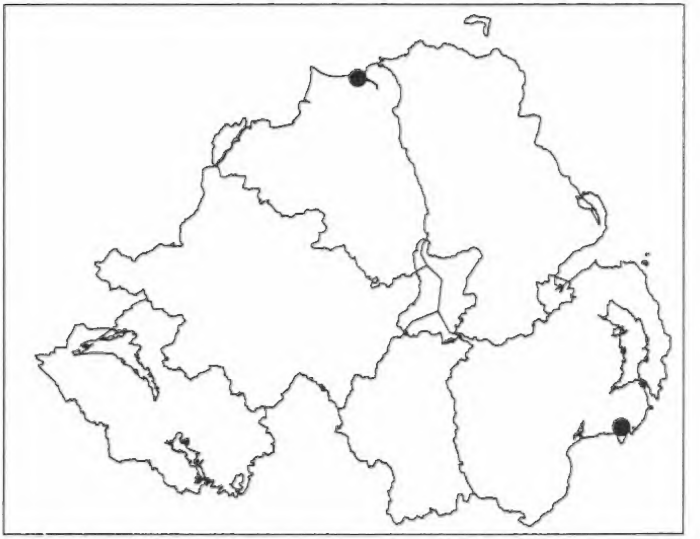


Corixa punctata

FIGURES 23-24: distribution maps of *Corixa iberica* and *C. panzeri*.

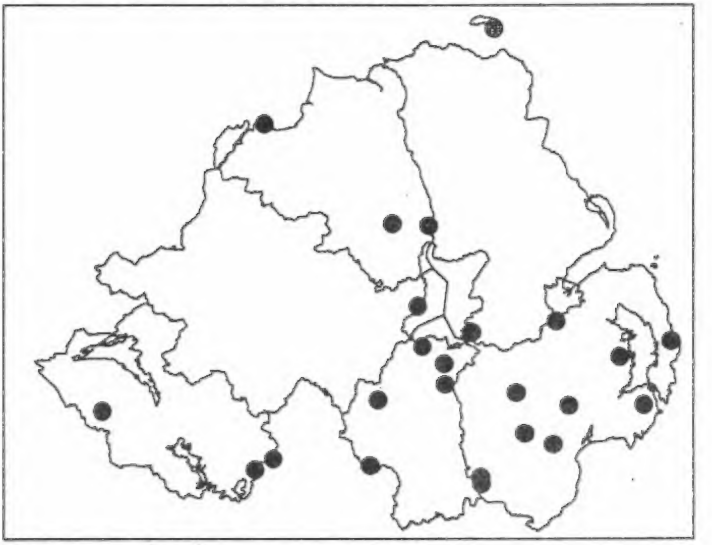


Corixa iberica

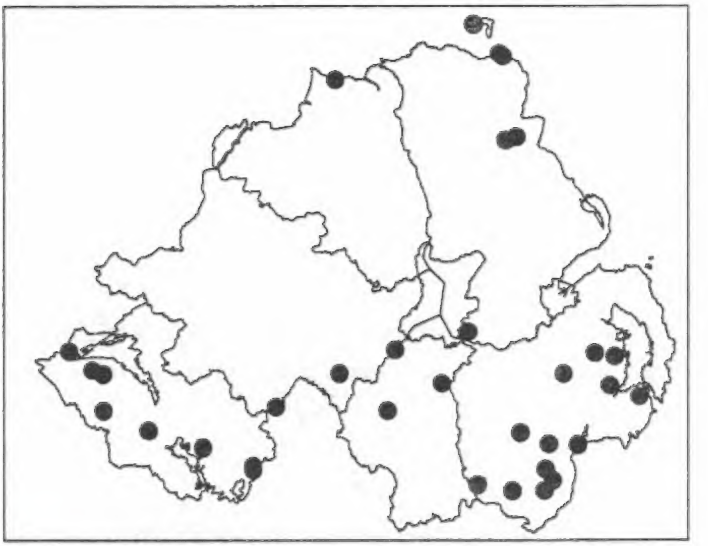


Corixa panzeri

FIGURES 25-26: distribution maps of *Hesperocorixa linnaei* and *H. sahlbergi*.

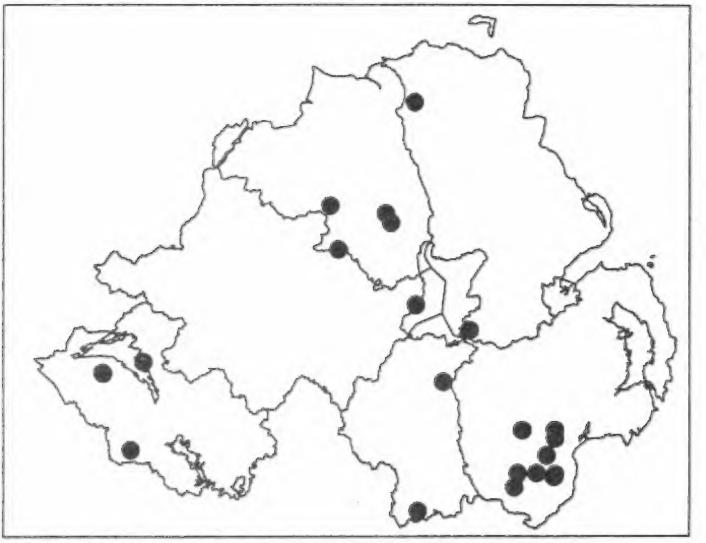


Hesperocorixa linnaei

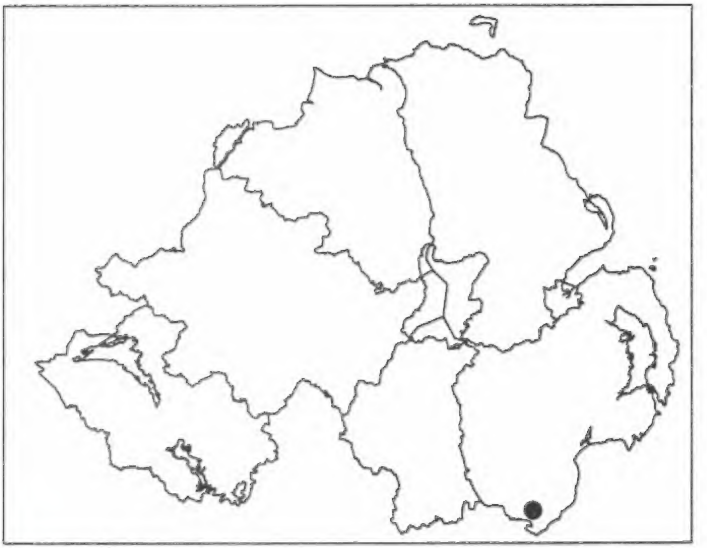


Hesperocorixa sahlbergi

FIGURES 27-28: distribution maps of *Hesperocorixa castanea* and *H. moesta*.

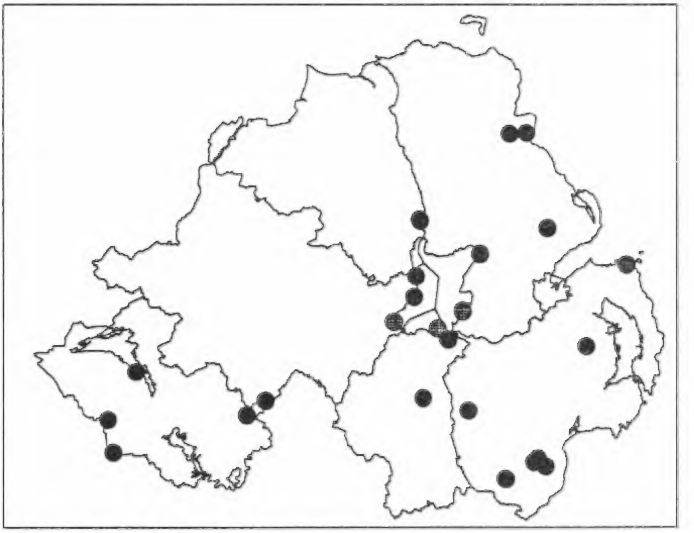


Hesperocorixa castanea

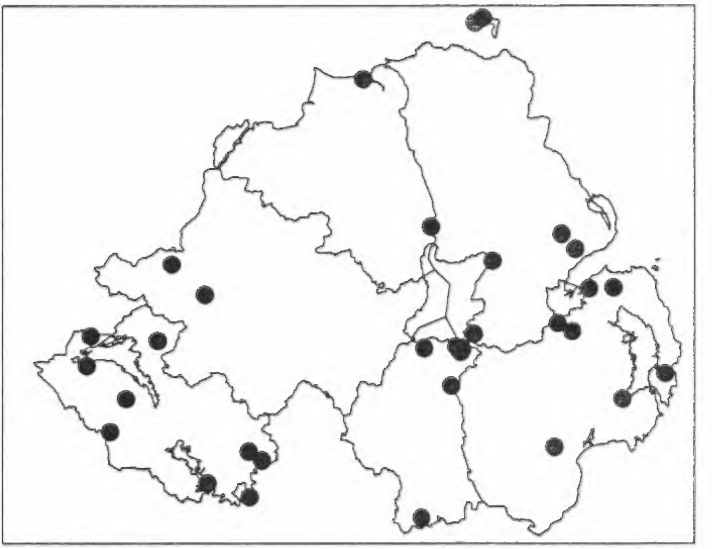


Hesperocorixa moesta

FIGURES 29-30: distribution maps of *Arctocorisa germari* and *Sigara dorsalis*.

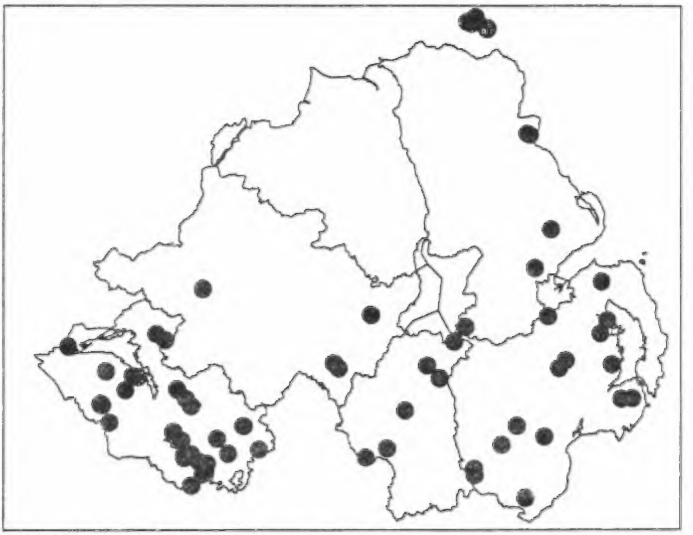


Arctocorisa germari

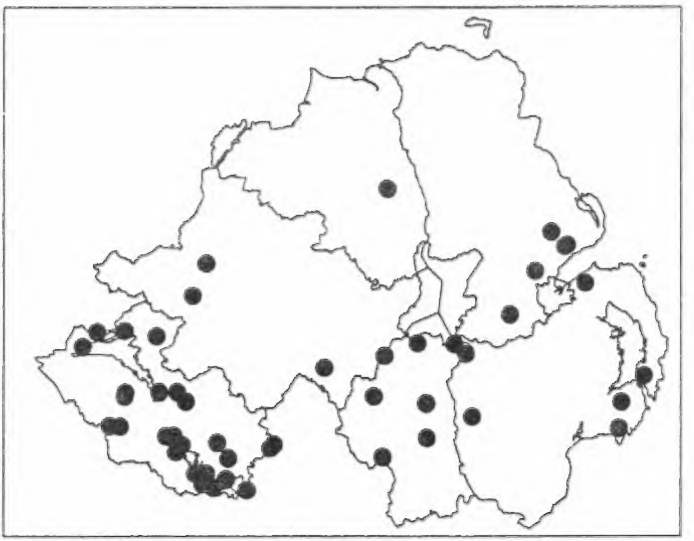


Sigara dorsalis

FIGURES 31-32: distribution maps of *Sigara distincta* and *S. falleni*.

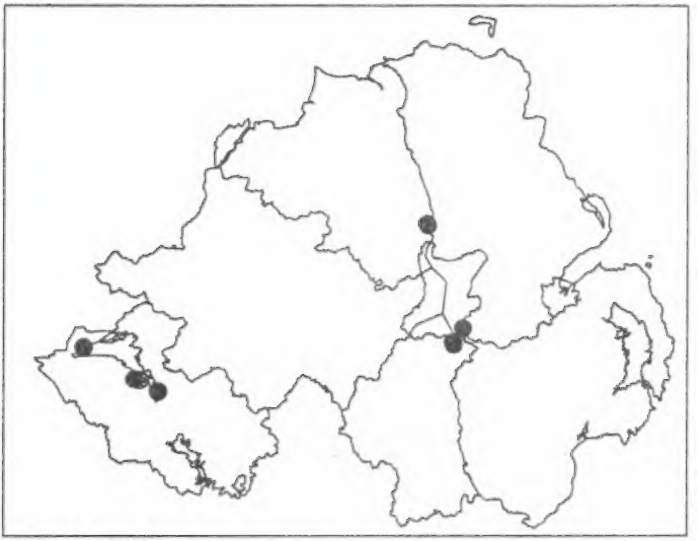


Sigara distincta

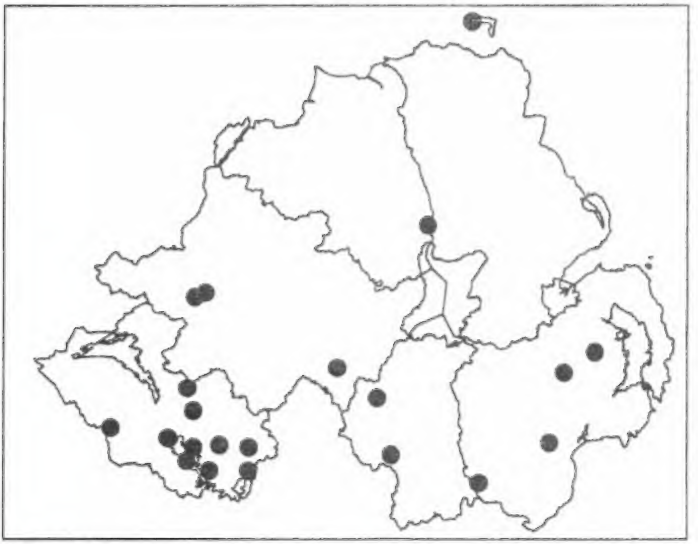


Sigara falleni

FIGURES 33-34: distribution maps of *Sigara fallenoidea* and *S. fossarum*.

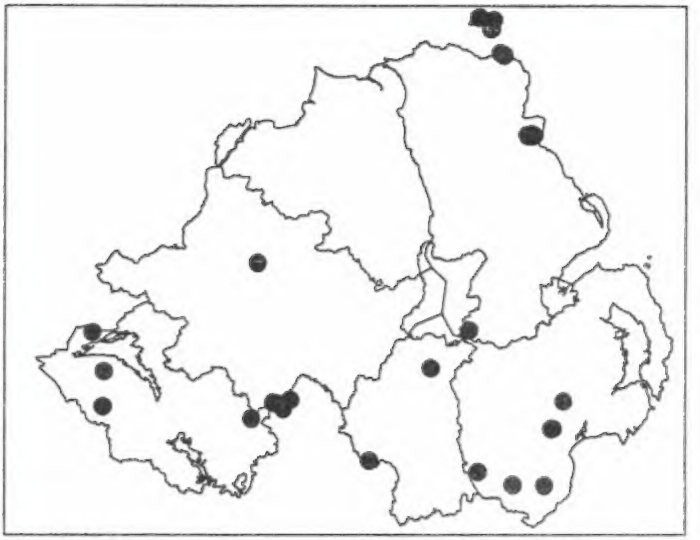


Sigara fallenoidea

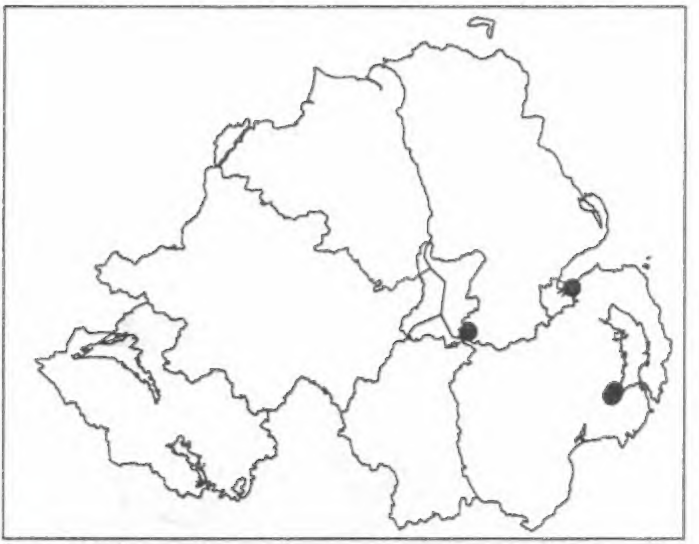


Sigara fossarum

FIGURES 35-36: distribution maps of *Sigara scotti* and *S. lateralis*.

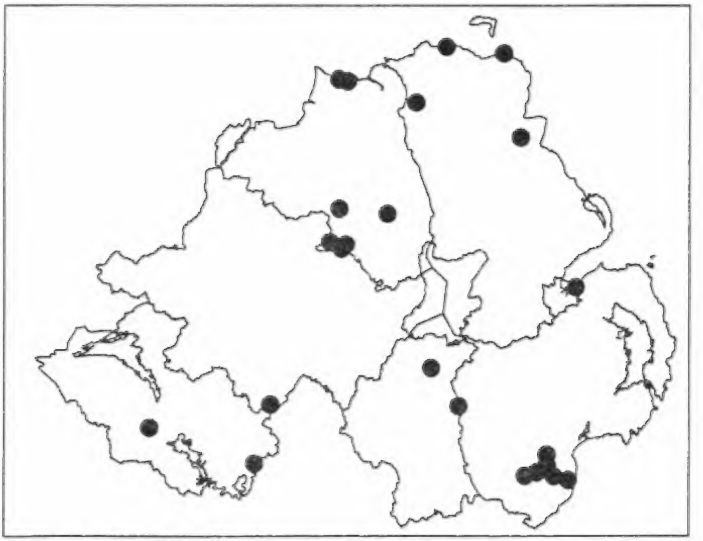


Sigara scotti

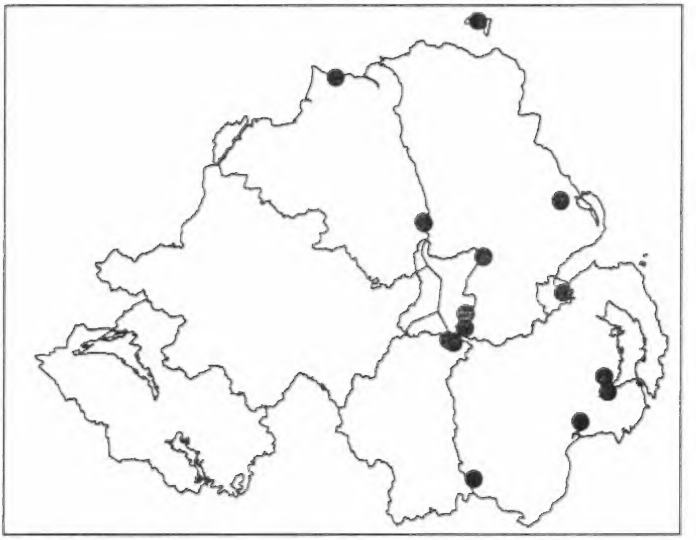


Sigara lateralis

FIGURES 37-38: distribution maps of *Sigara nigrolineata* and *S. concinna*.

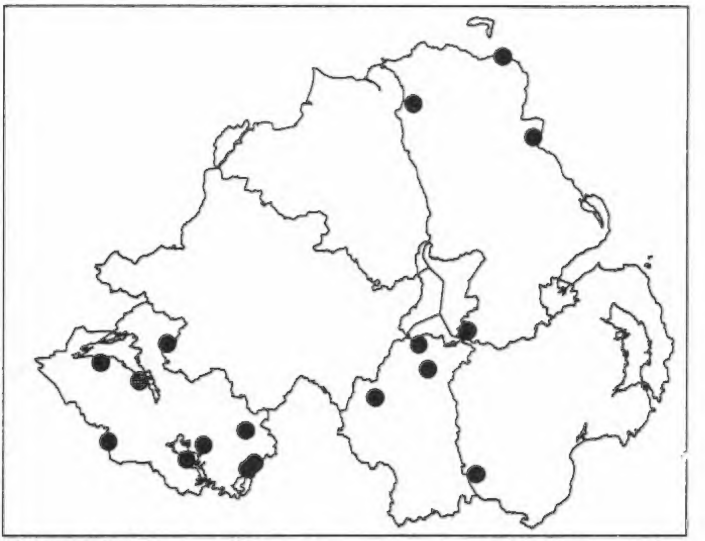


Sigara nigrolineata

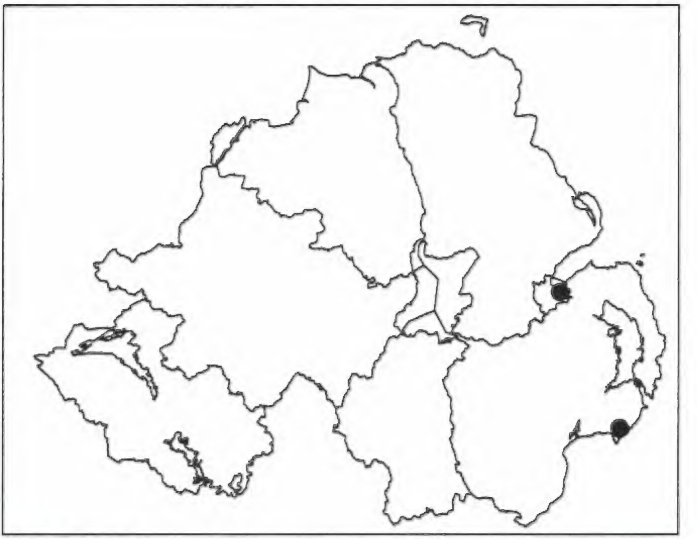


Sigara concinna

FIGURES 39-40: distribution maps of *Sigara semistriata* and *S. stagnalis*.

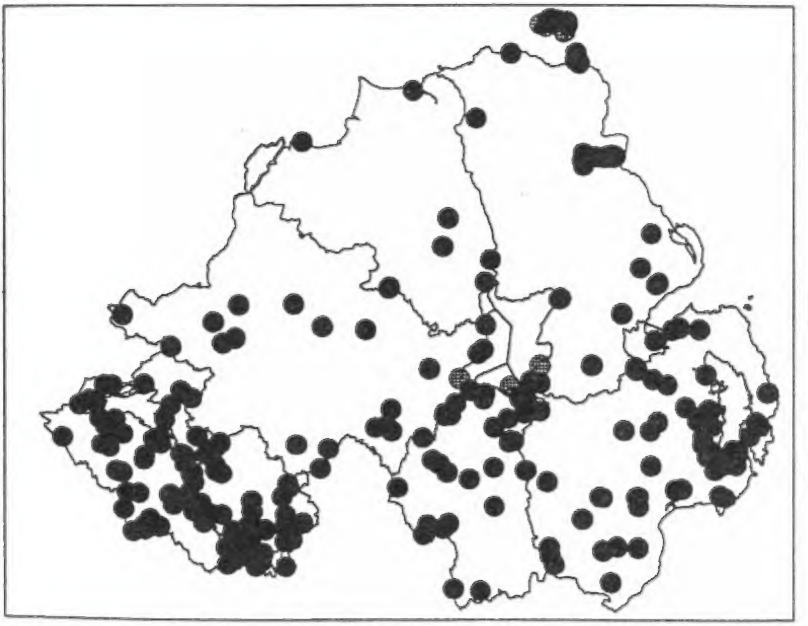


Sigara semistriata



Sigara stagnalis

FIGURE 41: overall coverage.



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2. Manuscripts should be submitted as typed copy on A4 paper, using double-spacing and 2.5cm (1 inch) margins.

3. Figures should be submitted in a size suitable for reduction to A5 without any loss of detail.

4. Records: please ensure that, when possible, the following information is incorporated in each record included in a manuscript:-
(a) latin name of organism.
(b) statement of reference work used as the source of nomenclature employed in the text. The describer's name should be also given when a zoological species is first mentioned in the text.
(c) locality details including at least a four figure Irish grid reference (e.g. N3946), county, vice-county number and some ecological data about the collection site, plus date of capture.
(d) collector's name and determiner's name (where different from collector's name), and
(e) altitude data should be included where relevant.

(5). Manuscripts should be submitted to the Editor, Dr J. P. O'Connor, at the following address:- National Museum of Ireland, Kildare Street, Dublin 2, IRELAND.

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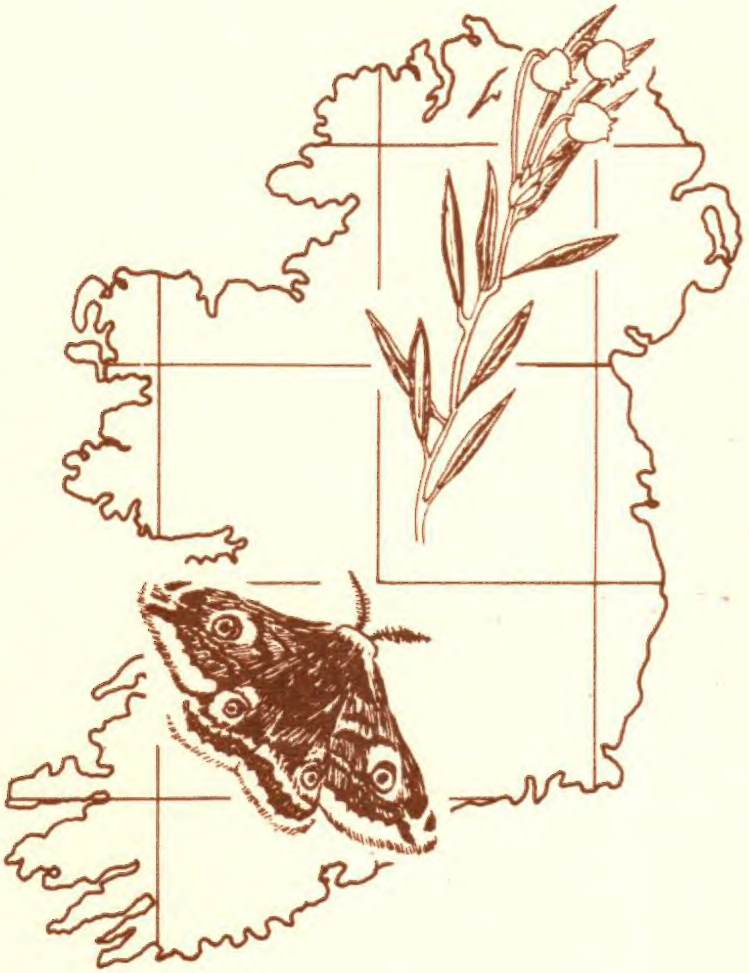
IRISH BIOGEOGRAPHICAL SOCIETY



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MYXOMYCETE RECORDS FROM THE NEW SURVEY OF CLARE ISLAND, CO. MAYO, IRELAND

R. McHugh

Dublin Institute of Technology, Cathal Brugha Street, Dublin 1, Ireland.

Gulielma Lister (1912) gives an account of Myxomycetes taken during the first Clare Island Survey. Miss Lister presents an interesting collection of Irish records, particularly from the Westport region of Co. Mayo, but unfortunately only two come from Clare Island itself. *Physarum conglomeratum* Rostafinski and *Craterium minutum* Fries were both obtained by Sir H.C.Hawley in October 1910. No information on habitat is provided, and neither species has appeared in the present survey. This consisted of three visits to the island:- 18-20 September 1992 (visit 1), 24-6 September 1993 (visit 2) and 30 September-2 October 1994 (visit 3). The principal site for collection was the Lassau woodland. Here material was found on fallen timber and dead leaves during the first two visits. Heavy rain at the time of visit 3 appeared to have washed away much Myxomycete material, so attention was transferred to the true fungi and results have been passed to Dr H. Fuller for inclusion in his account.

In addition to direct collection, Myxomycetes can be obtained by culturing bark samples removed from living trees, and oak (*Quercus*) appears to be the most productive species in this country. Lassau includes two oak trees: bark from the larger (tree A) was taken on visits 1 and 3; bark from tree B on visits 2 and 3.

The records are generally unexciting, with the exception of *Clastoderma debaryanum* Blytt, which appeared in large numbers on both tree B cultures, and which has been previously recorded once only in Ireland as a single sporangium on an oak culture from Abbeyleix, Co. Laois (Ing and McHugh, 1988). In addition to records from the island, *Mucilago crustacea* Wiggers was collected on 18 September 1992 from grass stems at Roonah Quay (L7481). It is of interest that Hawley obtained this species in the original survey in the vicinity of Louisburgh, Co. Mayo.

Lassau is situated to the north of the road leading to the lighthouse. On the south side, a stream runs parallel to this road. On the bank of the stream, *Didymium squamulosum* (Albertini

and de Schweinitz) Fries was found fruiting on grass debris on 19 September 1992. All other island records come from Lassau and are listed here. Both sites have grid ref. L7087. The year of collection is indicated by the visit number, and in the case of cultured species the letter A or B for the source tree is appended.

Ceratiomyxa fruticulosa (Müller) Macbride

Betula wood decayed. 1

Echinostelium fragile Nannenga-Bremekamp

A: 1, 3

E. minutum de Bary

A: 1. B: 2, 3

Clastoderma debaryanum Blytt

B: 2,3

Licea parasitica (Zukal) Martin

A:1

L. scyphoides Brooks and Keller

A:1

L. testudinaceae Nannenga-Bremekamp

A:1

Lycogala epidendrum (L.) Fries*

Corylus wood. 2

Arcyria cinerea (Bulliard) Persoon

Betula wood decayed. 1

A. denudata (L.) Wettstein

Corylus sticks. 1

A. incarnata (Persoon) Persoon

Corylus wood decorticated. 2

Trichia affinis de Bary

Corylus sticks waterlogged. 1; *Betula* wood decorticated. 2

T. botrytis (Gmelin) Persoon

Betula bark. 2

Comatricha nigra (Persoon) Schroeter

Betula leaf. 1; *Ilex* leaves. 2

Lamproderma columbinum (Persoon) Rostafinski

Moss on *Betula* wood. 1

L. scintillans (Berkeley and Broome) Morgan

Ilex leaves. 1, 2

Macbrideola cornea (G. Lister and Cran) Alexop.

A: 1, 3

Paradiacheopsis solitaria (Nannenga-Bremekamp) Nannenga-Bremekamp

A: 1

Stemonitis virginiensis Rex

Betula wood decayed. 1

Badhamia foliicola Lister

A: 3

Physarum viride (Bulliard) Persoon

B: 2, 3

Diderma effusum (Schweinitz) Morgan

Ilex leaves. 2

Didymium nigripes (Link) Fries

Ilex leaves. 2

D. squamulosum (Albertini and Schweinitz) Fries

Corylus sticks. 1; *Ilex* leaves. 2

* The *Lycogala* aethalia were of the type recently assigned by Nannenga-Bremekamp and Ing (in press) to *Lycogala confusum*.

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Ing, B. and McHugh, R. (1988) A revision of Irish Myxomycetes. *Proc. R. Ir. Acad.* **88B**, 99-117.

Lister, G. (1912) Clare Island Survey 63: Mycetozoa. *Proc. R. Ir. Acad.* **31**: 1-20.

Nannenga-Bremekamp, N. E. and Ing, B. (in press) The taxonomy of the *Lycogala epidendrum* complex. First international congress on the taxonomy and ecology of Myxomycetes, Chester College, England.

Bull. Ir. biogeog. Soc. No. 18 (1995)

THE CRANEFLIES (DIPTERA) OF IRELAND. PART 1. LIMONIIDAE: PEDICIINAE

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Abstract

A total of 15 species of Pediciinae are known from Ireland. This paper is the first part of a series on the Irish craneflies to provide comprehensive records and distribution maps of all species known to occur in Ireland.

Introduction

The earliest work, which included records of Irish Pediciinae, is Haliday (1833) which listed a total of six species of which three, i.e. *Ula mollissima* Haliday, *Limnobia demissa* Haliday [= *bimaculata* Schummel] and *Limnobia pavida* Haliday, were described as new to science. A lectotype of *U. mollissima* was designated by Hutson and Vane-Wright (1969). The same six Irish species given in Walker (1856) are probably based on Haliday (1833). Between 1895 and 1949 there were a few records published in Ireland (Anon, 1895; Carpenter, 1895, 1908; Grimshaw, 1912; Beirne, 1949). Edwards (1929) added *Dicranota lucidipennis* (Edwards) and the same record is repeated in Edwards (1938) and Coe (1950). It is the only Irish species mentioned in the latter publication. Edwards (1938) also mentions *Pedicia littoralis* (Meigen), *Dicranota pavida* (Haliday) and *U. sylvatica* sensu Edwards [= *mollissima*] as occurring in Ireland. In some publications the larvae of *Dicranota* have been recorded from sites during ecological surveys of rivers but the particular species involved were not determined (Frost,

1939; Fahy, 1972a, 1973). Ecological work on the immature stages were undertaken by Fahy (1972b) on *Dicranota guerini* Zetterstedt and by Okely (1979) on *Tricyphona immaculata* (Meigen). Hazelton (1974a, b) reported on specimens discovered in Irish caves. Mendl (1987) made several collecting trips to Ireland and recorded ten Pediciinae species of which five, *Dicranota claripennis* (Verrall), *D. exclusa* (Walker), *D. subtilis* Loew, *Pedicia occulta* (Meigen) and *Tricyphona schummeli* (Edwards), were new to the country. Ashe *et al.* (1991) added *Pedicia straminea* (Meigen) to the Irish list. Hancock (1990) and Blackith *et al.* (1991) include some records from Counties Kerry and Wicklow respectively.

Materials and methods

The Irish national grid reference (six or four figure reference) is included where possible followed by the Universal Transverse Mercator (UTM) 50km grid reference in parenthesis. The method used to obtain the UTM references is described in Rasmont *et al.* (1986). The data included in Mendl's (1987) work on Irish species are not repeated in detail but the relevant UTM grid references have been calculated for each record and incorporated into the distribution maps. The nomenclature for the Pediciinae follows Savchenko *et al.* (1992). Species were identified using Coe (1950) and an unpublished key prepared by Alan Stubbs.

List of collectors and abbreviations used for collectors' names

P. Ashe = PA; B. P. Beirne = BPB; R. E. Blackith = REB; R. M. Blackith = RMB; P. J. Chandler = PJC; J. H. Cole = JHC; M. Dierks = MD; F. W. Edwards = FWE; E. Fahy = EF; Mr. Farrell = MF; P. H. Grimshaw = PHG; J. N. Halbert = JNH; A. H. Haliday = AHH; E. G. Hancock = EGH; H. Heal = HH; A. G. Irwin = AGI; R. A. Lass = RAL; R. Moles = RM; R. Nash = RN; J. P. O'Connor = JPOC; J. P. O'Connor and M. A. O'Connor = JMOC; E. F. Okely = EFO; P. Oosterbroek = PO; R. F. Scharff = RFS; K. C. Side = KCS; R. W. Smith = RWS; M. C. D. Speight = MCDS; A. E. Stubbs = AES; R. I. Vane-Wright = RIVW; S. Wistow = SW.

A checklist of species of the Subfamily Pediciinae recorded from Ireland

Subfamily Pediciinae

Tribe Ulini

Ula mollissima Haliday, 1833

Ula sylvatica (Meigen, 1818)

Tribe Pediciini

Dicranota (*Dicranota*) *bimaculata* (Schummel, 1829)

Dicranota (*Dicranota*) *guerini* Zetterstedt, 1838

Dicranota (*Paradicranota*) *pavida* (Haliday, 1833)

Dicranota (*Paradicranota*) *subtilis* Loew, 1871

Dicranota (*Rhaphidolabina*) *claripennis* (Verrall, 1888)

Dicranota (*Rhaphidolabina*) *lucidipennis* (Edwards, 1921)

Dicranota (*Rhaphidolabis*) *exclusa* (Walker, 1848)

Pedicia (*Amalopis*) *occulta* (Meigen, 1830)

Pedicia (*Crunobia*) *littoralis* (Meigen, 1804)

Pedicia (*Crunobia*) *straminea* (Meigen, 1838)

Pedicia (*Pedicia*) *rivosa* (Linnaeus, 1758)

Tricyphona immaculata (Meigen, 1804)

Tricyphona schummeli (Edwards, 1921)

Tribe Ulini

***Ula mollissima* Haliday, 1833**

A woodland species that has been bred from fungi growing on dead wood. In Britain widespread but mainly outside the uplands. In Ireland widespread, marginally more commonly recorded than *sylvatica*.

DOWN: x.1827-x.1831, Holywood (UF.1), AHH (Haliday, 1833; Edwards, 1938, sub *sylvatica*); **DUBLIN**: 17.vii.1971, Howth O2-3- (PV.4), PJC; **MAYO**: 29.ix.1977, Westport Demesne L9884 (MV.3), PJC; 25-27.ix.1974, Cong M1555 (MV.4), PO; **SLIGO**: 1.x.1977, Templehouse G6-1- (NV.1), PJC; **WATERFORD**: 1.iv.1991, Portlaw Woods S4415 (PT.1), JMOC; **WICKLOW**: iv.1988, Blackditch Wood O3103 (PU.3), REB/RMB (Blackith *et al.*,

1991, sub *sylvatica*); 15.v.1991, Knocksink Wood O2118 (PU.3), PA; 5.v.1992, wood near Powerscourt Waterfall O204115 (PU.3), PA (reared from fungus under *Quercus*, collected 2.v.1992).

***Ula sylvatica* (Meigen, 1818)**

A characteristic woodland species that breeds in woodland floor fungi. Very widespread in Britain and the dominant member of the genus in upland districts. In Ireland widespread but seemingly not the dominant *Ula*. Edwards (1938) erroneously considered *sylvatica* and *mollissima* to be synonymous and his *sylvatica* record really refers to Haliday's Co. Down *mollissima* record (see above).

ANTRIM: 24.v.1975, Portglenone Forest C9802 (PA.3), AGI; **CARLOW**: 14.vi.1991, Bahana Woods S7239 (PU.2), JMOC; **KERRY**: 13.ix.1982, Lough Slat Q601080 (MT.1), EGH (Hancock, 1990); **MAYO**: 25-27.ix.1974, Cong M1555 (MV.4), PO; **WEXFORD**: 17.vi.1990, river at Fethard S7806 (PT.1), JPOC; **WICKLOW**: 7.vii.1969, Glencree O1-1-(PU.3), PJC; 28.vi.1992, Glendalough T1195 (PU.3), PA (reared from fungus collected on 14.v.1992).

Tribe Pediciini

***Dicranota* (*Dicranota*) *bimaculata* (Schummel, 1829)**

Haliday's *demissa* is regarded as a synonym of *bimaculata*.

DOWN: 1827-1831, Holywood (UF.1), AHH (Haliday, 1833, sub *Limnobia demissa* Haliday); **KERRY**: 13.ix.1982, Lough Slat Q601080 (MT.1), EGH (Hancock, 1990); **MAYO**: 25-27.ix.1974, Cong M1555 (MV.4), PO; **WATERFORD**: 1-31.vii.1990, Dunhill S5104 (PT.1), MCDS; **WICKLOW**: 22.ix.1990, Glendalough T1296 (PU.3), PA; 16.v.1992, Russelstown Park N9610 (PU.3), JMOC.

***Dicranota* (*Dicranota*) *guerini* Zetterstedt, 1838**

Mendl (1987) records it from one site in Co. Galway (Corrib Catchment). Fahy (1972) does not give specific details for each of his three sites but adults were found from March to September inclusive.

DONEGAL: 1969-1970, stream near Kilrean G8192 (NA.1), EF (Fahy, 1972b); **KERRY**: 1969-1970, stream near Newtown Sandes R1040 (MU.4), EF (Fahy, 1972b); **MAYO**: iii.-ix.1969-1970, Altahoney River F9505 (MV.3), EF (Fahy, 1972b).

***Dicranota* (*Paradicranota*) *pavida* (Haliday, 1833)**

Mendl (1987) recorded it from Counties Cork, Galway, Kerry, Mayo and Wicklow. **CARLOW**: 15.iv.1991, Altamont Gardens S8665 (PU.4), JPOC; **CORK**: 29.v.1992, Glengarriff Forest Park V9157 (MT.4), PA; **DOWN**: 1827-1831, Holywood (UF.1), AHH (Haliday, 1833, sub *Limnobia pavida* Haliday); **KERRY**: 24-27.v.1929, Killarney (MT.3), FWE (Edwards, 1938); 14.ix.1982, near Dreenagh Q715320 (MU.2), EGH (Hancock, 1990); 29.v.1992, Clydagh Bridge, River Flesk W1183 (MT.3), PA; 31.v.1992, stream at Staigue Fort V6064 (MT.2), PA; **WEXFORD**: 7.vi.1986, Oaklands S715255 (PU.2), JMOC; 29.v.1987, Oaklands S7125 (PU.2), JPOC; 26.iii.1989, J. F. Kennedy Park S7319 (PT.1), JMOC; **WICKLOW**: 18.ix.1968, near Redcross T2483 (PU.3), PJC; 26.vi.1975, 27.viii.1981, Bellevue Woods, Glen of the Downs O2-1- (PU.3), PJC, JPOC; 7.viii.1981, Slade of Saggart O033245 (PV.4), JPOC; viii.1988, Ballyorney Wood O2216 (PU.3), REB/RMB; x.1988, Dargle Glen O2215 (PU.3), REB/RMB; x.1988, Knocksink Gorge O2213 (PU.3), REB/RMB; 16.v.1992, Russelstown Park N9610 (PU.3), JMOC.

***Dicranota* (*Paradicranota*) *subtilis* Loew, 1871**

Known from Co. Kerry (Beara Peninsula) (Mendl, 1987).

DUBLIN: 9.iii.1983, Bohernabreena O094223 (PV.4), PA; **WICKLOW**: 18.ix.1968, Rí Fearta Church, Glendalough T1296 (PU.3), PJC; 19.iii.1983, Knocksink Wood O216182 (PU.3), PA; 26-27.iv.1986, Glen of the Downs O2611 (PU.3), JMOC; 17.iii.1988, Devil's Glen T2399 (PU.3), JPOC.

***Dicranota* (*Rhaphidolabina*) *claripennis* (Verrall, 1888)**

Mendl (1987) recorded it from Counties Cork, Kerry, Waterford and Wicklow. **KERRY**: 9.ix.1981, Looscaunagh Lough V883794 (MT.3), JPOC; 13.ix.1982, Lough Slat Q601080 (MT.1), EGH (Hancock, 1990); **WEXFORD**: 20.iv.1990, Oaklands S7125 (PU.2), JPOC; **WICKLOW**: 16.ix.1968, woods opposite Aughrim River T1-7- (PU.3), PJC; vi.1988, Killoughter marsh field T3199 (PU.3), REB/RMB; vii.1988, Carrageenshinnagh O1404 (PU.3), REB/RMB; xi.1988, Quill Wood O2415 (PU.3), REB/RMB; 24.iv.1989, Glendalough T1195 (PU.3), JMOC.

***Dicranota* (*Rhaphidolabina*) *lucidipennis* (Edwards, 1921)**

KERRY: 24-27.v.1929, Killarney (MT.3), FWE (Edwards, 1929, 1938; Coe, 1950);

WICKLOW: vi.1988, Killoughter Marsh Field T3199 (PU.3), REB/RMB (Blackith *et al.*, 1991).

***Dicranota* (*Rhaphidolabis*) *exclusa* (Walker, 1848)**

Recorded from Co. Waterford by Mendl (1987).

WICKLOW: 18.ix.1968, stream near Lough Dan O1-0- (PU.3), PJC; 4.v.1975, Ballybraid T1191 (PU.3), MCDS.

***Pedicia* (*Amalopis*) *occulta* (Meigen, 1830)**

Recorded from one site in Co. Kerry (Beara Peninsula) by Mendl (1987).

***Pedicia* (*Crunobia*) *littoralis* (Meigen, 1804)**

Mendl (1987) recorded it from Counties Galway, Waterford and Wicklow.

CLARE: 25.vii.1966, Poll-an-Ionian, Ballylacken area M1203(MU.3), RAL (Hazelton, 1974a, b); 28.vii.1966, St. Catherine 1, Doolin Cave System R0898 (MU.3), RAL (Hazelton, 1974a, b); **DOWN**: 1827-1831, Holywood (UF.1), AHH (Haliday, 1833, in *Limnobia*); **DUBLIN**: 22.vi.1895, Glenasmole (PV.4), MF (Carpenter, 1895, 1908); **FERMANAGH**: 21.vii.1966, Pollasumera, Marble Arch Cave System, 500 feet underground, H125337 (NA.4), RAL (Hazelton, 1974a, b); **KERRY**: 30.vi.1969, Torc Cascade V9684 (MT.3), PJC; **LEITRIM**: 29-30.VIII.1992, waterfall near Roosky G8951 (NA.4), PA; **MAYO**: vii.1910, Clare Island (MV.1), PHG (Grimshaw, 1912); **WATERFORD**: 21.vi.1975, Gurteen S2-1- (NT.3), PJC; 2.vii.1983, Woodstown S693052 (PT.1), JMOC; **WICKLOW**: viii.1909, Glencree (PU.3), RFS; 27.v.1988, Avondale T1985 (PU.3), JPOC; viii.1988, Ballyorney Wood O2216 (PU.3), REB/RMB; 27.vi.1991, Avondale River, Vale of Clara T1-9- (PU.3), SW.

***Pedicia* (*Crunobia*) *straminea* (Meigen, 1838)**

WICKLOW: 16.ix.1968, near Poll an Easa Waterfall, Glendalough T1195 (PU.3), PJC (Ashe *et al.*, 1991); vi.1988, 13.vi.1989, Upper Lough Bray O1315 (PU.3), REB/RMB.

***Pedicia* (*Pedicia*) *rivosa* (Linnaeus, 1758)**

Recorded from one site in Co. Wicklow by Mendl (1987). The Kenmare, Co. Kerry, specimen noted below was probably collected on an excursion to Kenmare on the 7-13.vii.1898, by J. N. Halbert. Beirne (1949) recorded some Diptera from Counties Kerry and/or Wicklow which included *P. rivosa* but unfortunately the date, locality or county were not specified.

CAVAN: 30.v.1982, Virginia N586882 (PV.1), JMOC; **CLARE**: 3.vii.1968, Poulnagollum Cave, Slieve Elva M1604 (MU.3), RWS (Hazelton, 1974a, b); **CORK**: 29.v.1974, Adrigole V7-4- (MT.2), KCS; **DOWN**: 1827-1831, Holywood (UF.1), AHH (Haliday, 1833); 2.viii.1972, Castlereagh J4474 (UF.1), RM; 14.iv.1974, west slope of Slievenaglogh, Mourne Mts J2822 (PA.4), AGI; 15.iv.1974, Rostrevor J1817 (PV.3), AGI; 18.viii.1974, Ballygowan J4163 (UF.2), AGI; **KERRY**: vii.1898, Kenmare (MT.4), JNH; 29.v.1992, West Cove, Caherdaniel V5659 (MT.2), PA; **LEITRIM**: 28.v.1986, woodland near Clooncoe Lake N110912 (NV.3), PA; **WICKLOW**: 7.vii.1969, Glencree O1-1- (PU.3), PJC; 12.vii.1983, near Calary Lower O234119 (PU.3), JPOC; iv.-x.1988, vii.1989, Blackditch Wood O3103 (PU.3), REB/RMB (Blackith *et al.*, 1991); iv.-x.1988, Killoughter Marsh Field T3199 (PU.3), REB/RMB (Blackith *et al.*, 1991); v.1988, Rockbottom Bog T2199 (PU.3), REB/RMB; xi.1988, Quill Wood O2415 (PU.3), REB/RMB; 15.v.1991, Knocksink O2117 (PU.3), JPOC.

***Tricyphona immaculata* (Meigen, 1804)**

Mendl (1987) recorded it from Counties Donegal, Galway, Kerry, Mayo, Sligo and Wicklow. From a study of a bog in Co. Mayo, Okely (1979) provides data on the morphology and separation of the four larval instars.

ANTRIM: 1.v.1971, 16.v.1975, Barnett's Park, Belfast J3268 (UF.2), RN; 1972, Hillsborough Forest J4458 (UF.2), HH; 2.ix.1972, Belfast J3269 (UF.2), RN; 28.v.1973, Belfast J3167 (UF.2), RN; 16.v.1975, Dixon Park J3067 (UF.2), AGI; 18.v.1975, Ballygowan J4063 (UF.2), AGI; 19.v.1975, Masserene J1485 (PA.3), AGI; 24.v.1975, Slievenance, near Trostan D1621 (PB.4), AGI; 24.v.1975, Glarryford Bog, near Clogh Mills D0515 (PA.3), AGI; **CAVAN**: 2.x.1989, Virginia Woods N5987 (PV.1), JMOC; 12.ix.1991, Woodlawn, Lough Sheelin N4686 (PV.1), JPOC; **CLARE**: 20.v.1970, above Lough Inchiquin R2690 (MU.3), PJC; 22.v.1970, Sliabh Elva, Burren M1-0- (MU.3), PJC; 22.v.1985, Cooleabeg M163020 (MU.3), JMOC; **CORK**: 29.v.1974, Dereenacarrin V8851 (MT.4), KCS; **DOWN**: 1827-1831, Holywood (UF.1), AHH (Haliday, 1833); 6.vii.1969, Stormont J3-7- (UF.1), AGI; 15.iv.1974, Rostrevor J1817 (PV.3), AGI; 8.ix.1974, north slope of Carn Mount, Mourne Mts, J2926 (PA.4), AGI; **DUBLIN**: 28.ix.1986, Royal Canal, Luttrellstown O0337 (PV.4), JMOC; **GALWAY**: 23.v.1974, Barna M2-2- (MV.4), KCS; 22.ix.-3.x.1974, Roundstone L7239 (MV.2), PO; 22.ix.-4.x.1974, near Roundstone L7239 (MV.2), MD; 24.ix.-2.x.1974, Recess

L8547 (MV.4), PO; **KERRY**: 17.x.1973, north shore of Lough Leane V9-9- (MT.3), PJC; 8.ix.1981, Kenmare Estate V945905 (MT.3), JPOC; 9.ix.1981, Looscaunagh Lough V883794 (MT.3), JPOC; 15.ix.1981, Tomies Wood V915885 (MT.3), JPOC; 29.v.1992, seepage at road tunnel north-west of Turner's Rock V902611 (MT.4), PA; 1.vi.1992, Derrycunihy, Killarney V9484 (MT.3), PA; **KILDARE**: 12.iv.1982, 11.ix.1985, Newbridge Fen N767166 (PU.1), JMOC/JPOC, also 17.ix.1991, N7615 (PU.1), PA; **LAOIS**: 19.v.1974, Spink S5-8- (PU.1), KCS; 20.ix.1982, The Derries N586050 (PU.1), JPOC; **MAYO**: iv.1970-vi.1972, Glenamoy F877334 (MA.4), EFO (Okely, 1979); 25-27.ix.1974, Cong M1555 (MV.4), PO; 29.ix.1977, Westport Demesne L9884 (MV.3), PJC; **MONAGHAN**: 20.v.1976, Carrickmacross H8403 (PV.1), JHC; 21.v.1976, Lough Egish H7813 (PV.1), JHC; **OFFALY**: 28.iv.1987, Charleville Wood N3222 (NV.4), JPOC; 21.v.1992, Cloneygowan N4714 (PU.1), PA; **ROSCOMMON**: 11.v.1970, Drumnone Dolmen G7-0- (NV.1), PJC; 14.v.1970, 28.ix.1977, Lough Ree N0-4- (NV.4), PJC; **SLIGO**: 13.v.1970, Ballysadare Bay G6-3- (NA.2), PJC; 1.x.1977, Templehouse G6-1- (NV.1), PJC; 1.x.1977, Glen of Knocknaree G6-3- (NA.2), PJC; **TYRONE**: 8.v.1970, Gortin Glen National Forest Park H4881 (PA.1), PJC; 9.v.1970, Baronscourt H3683 (PA.1), PJC; **WESTMEATH**: 6.v.1987, Ballynafid N4060 (PV.2), PA; **WEXFORD**: 3.vi.1974, Enniscorthy S9-4- (PU.2), KCS; 9.vi.1982, Curracloe T1127 (PU.4), JPOC; 28.iii.1989, Tintern T7810 (PT.1), JPOC; 30.iii.1989, Ferrycarrig T0023 (PT.3), JPOC; **WICKLOW**: 16.ix.1968, near Poll an Easa Waterfall, Glendalough T1195 (PU.3), PJC; 16.ix.1968, woods opposite Aughrim River T1-7- (PU.3), PJC; 24.v.1970, Green Road, Glendalough T1-9- (PU.3), PJC; 3.vi.1974, Arklow T2-7- (PU.3), KCS; 4.v.1975, Ballybraid T1191 (PU.3), MCDS; 19.ix.1982, Russelstown Park N9610 (PU.3), JPOC; 23.ix.1983, 23.ix.1989, near Calary Lower O2311 (PU.3), JMOC; iv.-x.1988, Blackditch Wood O3103 (PU.3), REB/RMB (Blackith *et al.*, 1991); iv.-x.1988, Killoughter Marsh Field T3199 (PU.3), REB/RMB (Blackith *et al.*, 1991); 27.v.1988, Avondale T1985 (PU.3), JPOC; v.1988, Rockbottom Bog T2199 (PU.3), REB/RMB; vi.1988, Clonmannon Wood T3098 (PU.3), REB/RMB; x.1988, Dargle Glen O2215 (PU.3), REB/RMB; x.1988, Knocksink Gorge O2213 (PU.3), REB/RMB; v.1989, Killoughter Fen T3199 (PU.3), REB/RMB (Blackith *et al.*, 1991); 24.iv.1989, Glendalough T1195 (PU.3), JPOC, also 14.v.1992, PA; 15.v.1991, Knocksink Wood O2118 (PU.3), PA; 20.vi.1991, 2.v.1992,

Kilmacanogue Marsh O2513 (PU.3), PA; 2.v.1992, Powerscourt Waterfall area O2011 (PU.3), PA; 16.v.1992, River Slaney, Baltinglass N8705 (PU.3), SW; 16.v.1992, Russelstown Park N9610 (PU.3), JMOC.

***Tricyphona schummeli* (Edwards, 1921)**

Recorded by Mendl (1987) from Counties Cork and Kerry.

Discussion

No Pediciinae have been recorded from eight Irish counties, i.e. Armagh, Derry, Kilkenny, Limerick, Longford, Louth, Meath and Tipperary. By far the most common and widespread Irish species is *T. immaculata*.

There are four species, *Dicranota* (*Paradicranota*) *gracilipes* Wahlgren, *Dicranota* (*Paradicranota*) *robusta* Lundström, *Dicranota* (*Paradicranota*) *simulans* Lackschewitz and *Tricyphona unicolor* (Schummel), which occur in the British Isles but which have not yet been found in Ireland. Three of these species are regarded as "notable" with *D. simulans* regarded as "rare" (Falk, 1991). With more intensive collecting we expect that all four species will eventually be discovered in Ireland. Two of the species on the Irish list, *D. guerini* and *D. lucidipennis*, are also regarded as "notable" species by Falk (1991). By utilizing the presence/ absence of such endangered, rare or notable species it is possible to give a measure of the conservation value of particular sites.

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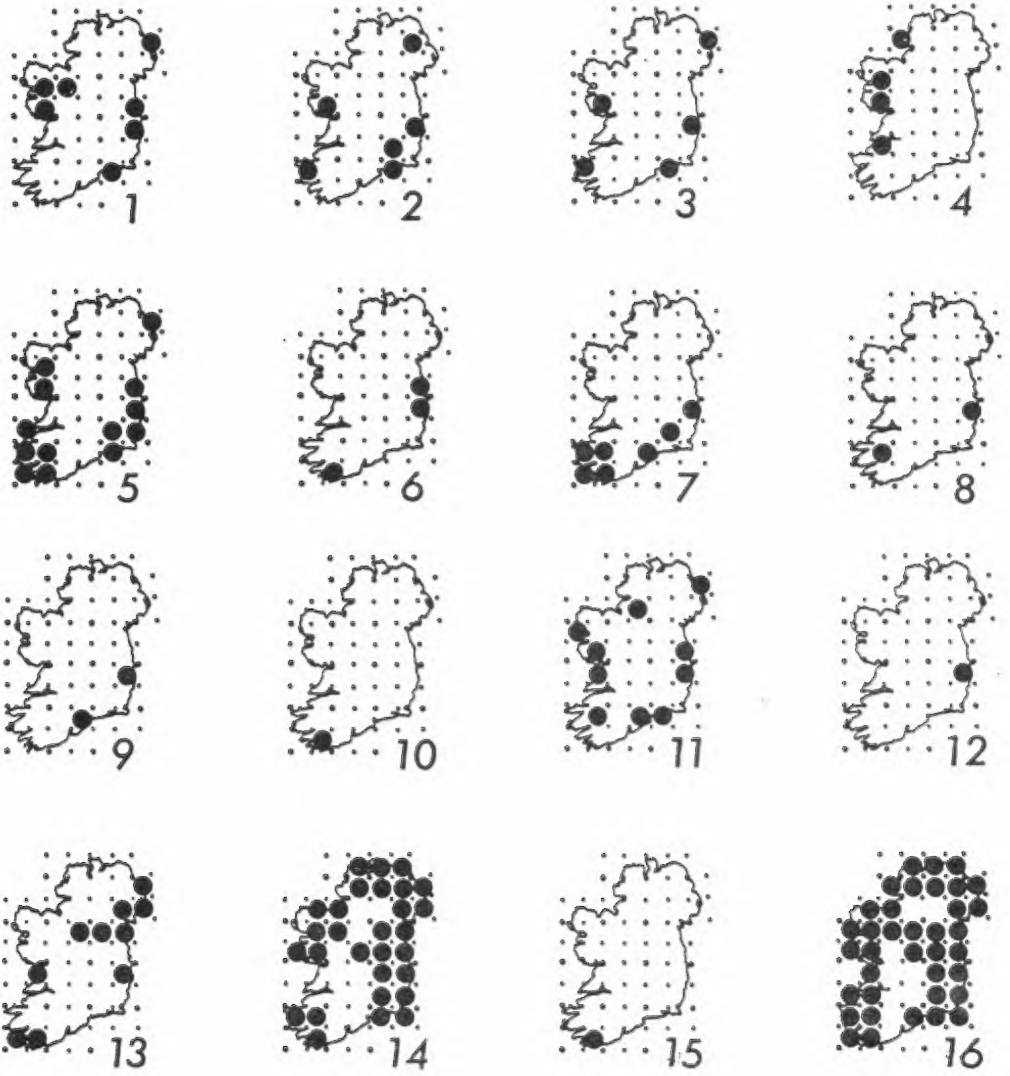
FIGURE 1: distribution maps, based on the UTM 50km grid, for Pediciinae craneflies species occurring in Ireland, as well as a coverage map for all records.

1: *U. mollissima;* 2: *U. sylvatica;* 3: *D. (D.) bimaculata;* 4: *D. (D.) guerini*; 5: *D. (P.) pavida;* 6: *D. (P.) subtilis*; 7: *D. (Ra.) claripennis;* 8: *D. (Ra.) lucidipennis;* 9: *D. (Rs.) exclusa;* 10: *P. (A.) occulta;* 11: *P. (A.) littoralis;* 12: *P. (A.) straminea;* 13: *P. (A.) rivosa;* 14: *T. immaculata;* 15: *T. schummeli*; 16: Coverage.



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THE FLORA OF THE NORTH-EAST OF IRELAND - SUPPLEMENTARY NOTES

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A third edition of *Stewart and Corry's Flora of the north-east of Ireland*, which covers the three vice-counties of Antrim, Down and Londonderry (H38, 39, 40), (Hackney, 1992) was recently published. Part I of these supplementary notes provides some basic statistics on the size of the flora, and a summary of additional species and extensions of range since the second edition (Praeger and Megaw, 1938) was published fifty-four years previously. For the sake of conformity, these notes follow the nomenclature of the third edition which was based on that of Clapham, Tutin and Moore (1987), but I have added in brackets the names listed in Kent (1992) where these differ.

The information in Part I is given in table form as follows:- Table 1: basic statistics of the flora; Table 2: extinctions in the flora; Table 3: species which have declined or show local extinctions; Table 4: additions to the flora since 1938; Table 5: extensions to the ranges of species since 1938; Table 6: species or hybrids so far un-recorded but probably present; Table 7: erroneous or doubtful old records; Table 8: protected species in N. E. Ireland; Table 9: Red Data Book species.

The list of extinctions is intended to cover all extinctions since recording effectively began: the earliest is therefore that of *Cephalanthera longifolia* in Co. Down where it has not been seen since William Sherard found it in 1694. The lists of additions and extensions of range, however, are limited to those occurring since 1938, the date of publication of the second edition. The abbreviated reference *Flora* which occurs in these tables refers solely to the third (1992) edition; likewise the second (1938) edition appears as *FNE1938*.

The symbols * and ** follow the practice of the *Flora* and indicate a naturalised introduction and an unnaturalised or casual introduction respectively. Unmarked species are considered natives.

Information listed which is based on information not published in the *Flora* (usually because it was received after the book went to press) is printed in italics.

Part II contains a list of corrigenda and addenda to the *Flora* and some additional records not included in the *Flora*.

PART I

TABLE 1. Basic statistics of the *Flora* of the north-east of Ireland.

	1938 edition	**1992 edition**
Charophyte spp.[1,2]	11	8
Conifers, native spp.[2]	3	3
Conifers, introduced spp. and hybrids	0	27[3]
Pteridophytes, native spp.	44	49
Pteridophyte hybrids	2	7
Pteridophytes, naturalised spp.	0	1
Pteridophytes, casual/planted spp.	0	8
Flowering plants, native spp.[4]	702	781
Flowering plants, hybrids	54	114
Flowering plants, casual spp.	272	254
Flowering plants, naturalised alien spp.	108	205
TOTAL native spp. and subspp.	**760**	**841**
TOTAL naturalised alien spp. and subspp.	**108**	**213**
TOTAL casual spp.	**272**	**280**
TOTAL hybrids[5]	**56**	**123**
GRAND TOTAL of all spp., subspp. and hybrids (**excluding microspp.**)	**1196**	**1457**
(***microspecies not included above***)		
microspecies *Rubus*	60	44
microspecies *Euphrasia*	5	8
microspecies *Hieracium*	36	39 (incl 3 introduced)
subspecies *Pilosella*	0	7
microspecies *Taraxacum*	3[6]	50
GRAND TOTAL of all **native** spp., subspp. and hybrids (**including microspp.**)	**859**	**981**[7]
GRAND TOTAL of **all** spp., subspp. and hybrids (**including microspp.**)	**1296**	**1600**

TABLE 2. Extinctions in the *Flora*.

Species	Date last reported
Chara pedunculata	1918.
Pilularia globulifera	1950.
Thelypteris palustris	before 1864 (Antrim), 1970 (Londonderry).
Asplenium onopteris	1942.
****Papaver argemone***	1935/37.
*****Diplotaxis muralis***	1934 (Down), 1943 (Londonderry).
*****Brassica nigra***	before 1888.
Cochlearia alpina (*C. pyrenaica*)	1935.
*****Camelina sativa*** sens. lat.	1927 (except for one plant of *C. alyssum* subsp. *integerrima* as casual 1984).
Hypericum hirsutum	1937.
****Silene gallica***	1952.
****Agrostemma githago***	before 1938.
****Sanguisorba minor***	before 1937.
Rosa* x *hibernica sens. strict.	c.1956 but transplanted into cultivation.
Rosa* x *praegeri	1937.
****Sedum lydium***	before 1938.
****Oenothera biennis***	before 1938 but casuals only.
****Scandix pecten-veneris***	1966 but much declined before that year.
****Polygonum rurivagum***	1914.
****Rumex alpinus*** (*R. pseudoalpinus*)	1957 (one site only).
Orthilia secunda	1920.
Monotropa hypopitys	1944 (one site only).
Primula veris* x *P. vulgaris[a]	before 1938 (one site only).
*****Blackstonia perfoliata***	1907 (one site only).
****Cuscuta epilinum***	1878.
Linaria repens* x *L. vulgaris	1937 (one site only with both parents).

Plantago major subsp. ***intermedia***	1907.
****Centaurea cyanus***	before 1938.
Hieracium hibernicum	1891 (one site only).
****Pilosella* x *floribunda*** (as *P. lactucella* in *Flora*)	1910.
*****Crepis nicaeensis***	1878.
****Stratiotes aloides***	1930.
Sisyrinchium bermudiana	1961 (status unclear in our area).
Cephalanthera longifolia	1694.
Carex buxbaumii	1886 (only Irish site).
****Lolium temulentum***	1947.
****L. remotum***	1928.
Puccinellia rupestris	c.1871.
Poa compressa	1950.
****Cynosurus echinatus***	1941 (casual only for period 1930-41).
Hordelymus europaeus	1949 (only Irish site).

Notes for Tables 1 - 2

[1] In the Charophyta, different numbers of species relate mainly to differences in taxonomic approach.

[2] "Species" in this table signifies a species or subspecies but excludes (except where stated) microspecies of *Rubus*, *Euphrasia*, *Hieracium*, *Pilosella officinarum* and *Taraxacum*. Segregates of *Alchemilla vulgaris* and *Rosa canina* agg. are included. Taxa of lower rank such as var. and forma are not counted in these tables. Hybrids are counted separately.

[3] Seven species naturalising, 18 species planted only, two hybrids planted only.

[4] Some species of uncertain status have been treated as natives in the third edition, i.e. *Picris echioides* and *Tragopogon pratensis*.

[5] It is frequently possible to distinguish the results of different directions of crossing of *Rosa canina* agg. hybrids, i.e. depending on which species is the male and which the female parent. In the tables, I have counted these as separate hybrids where they have been distinguished in

the records.

[6] In the 1938 edition the microspecies of *Taraxacum* relate very approximately to the modern sections of the genus.

[7] I have counted all the microspecies of *Taraxacum* as native although an uncertain number of the "weed" species are probably aliens. Three microspecies of *Hieracium* are excluded here as being definitely introduced.

[8] *Primula veris* has probably no claim to being native in the north-east of Ireland and the loss of this hybrid probably relates to the almost total loss of this parent outside gardens after the 1930s. *P. veris* appeared to be extinct when the 1992 edition of the *Flora* was published, but there is a 1994 report of c.100 plants appearing spontaneously in Belvoir Park, Co. Down.

TABLE 3. Species which have declined or show local extinctions.

Species	Notes
Osmunda regalis	Generally rarer because of bog destruction.
Glaucium flavum	Declined - one principal site at present.
Papaver dubium and ***P. lecoquii***	Now rare.
****Sinapis alba***	Extinct in Down and Londonderry (but abundant at one Antrim site at present).
Teesdalia nudicaulis	Extinct in Antrim by 1938.
Radiola linoides	Only three reports since 1945, all in Londonderry, latest 1986.
Sanguisorba officinalis	One site in Down and formerly two areas in Antrim; gone from one of its Antrim sites long before 1936 and declined considerably in its other area since 1938 and now reduced to a single small field. Also reduced at its Down site by destruction of pastures where it grew.
Myriophyllum alterniflorum var. ***americanum***	Formerly characteristic of Lough Neagh but no sightings in that lake since 1975.
Eryngium maritimum	Declined, especially in Down and Londonderry where it is now extremely rare.
****Peucedanum ostruthium***	Persistent according to *FNE1938* but few recent reports.
Ligusticum scoticum	This species has retreated northwards - no Down records after 1966 and last reported from its most southerly station (Ballyhalbert) in the period 1935 - 1937.
Andromeda polifolia	Extinct before 1938 in Down but still extant in Antrim and Londonderry.
****Primula veris***	Several old sites in all three counties but only one post-1938 site in Co. Down (1994).

****Nymphoides peltata***	Established for about 130 years in River Lagan but became extinct c.1966: but reintroduced recently elsewhere - see under *Extensions to Ranges*.
Mertensia maritima	Declined over the past 150 years and now almost confined to three principal stretches of coast in Down and Antrim (Rathlin Island, Giant's Causeway and between Glassdrumman and Bloody Bridge): extinct in Londonderry, last report for that county is 1919.
Cynoglossum officinale	Declined since 1938 and now mainly in three sites (Dundrum Dunes, South Island in Strangford Lough and Killard Point); it has declined in abundance even at one of these, i.e. Dundrum Dunes, apparently because of lack of rabbit disturbance there.
Echium vulgare	Gone from its Antrim sites listed in *FNE1938*.
Adoxa moschatellina	One patch only, c.1 metre square, by 1970s. Attempts, partially successful, were made in the 1980's to establish new colonies nearby.
Filago vulgaris	Now very rare.
Gnaphalium sylvaticum	Generally rarer.
Anthemis cotula	Declined since the late 19th century.
A. arvensis	Declined since the late 19th century.
Chamaemelum nobile	Declined since the late 19th century.
Potamogeton* x *cooperi	Not seen in its principal site (i.e. Sixmilewater) since 1939, but see *Extensions to ranges*.
Calamagrostis epigeios	Three sites listed in *FNE1938*, only one extant 1992.
C. stricta	Gone from most of its former sites: only a few extant sites in 1992.

TABLE 4. Additions to the *Flora* since 1938.

This table lists all taxa which are included in the 1992 edition which were not included in the previous (1938) edition, *except* for a number of insignificant casuals or planted species, bamboos, forestry and ornamental conifers and microspecies of *Hieracium* and *Taraxacum*. If the date of first record appears in parenthesis it indicates that the taxon was represented in herbarium collections but remained unidentified or unrecognised until that date (e.g. *Polypodium cambricum* was clearly collected in the north-east as far back as the 1870s but was not clearly recognised as such until the 1970s).

Records received after the *Flora* had gone to press or which are omitted from the third edition for other reasons are printed in italics. This list is consequently complete up to August 1994.

n.d. = no date available.

Taxon	Counties for which taxon is now (1994) recorded	Date of first record
Tolypella nidifica var. ***glomerata***	DAL	1985
****Selaginella kraussiana***	DA	1955
Asplenium trichomanes		
subsp. ***trichomanes*** (one site only - first Irish record)	D	1981
Polypodium vulgare agg. segregates and their hybrids recognised (earliest specimens 1870s)		(c. 1970)
P. vulgare s.s.	DAL	
P. interjectum	DAL	
P. cambricum	DA	
P. cambricum x ***P. interjectum***	DAL	
P. cambricum x ***P. vulgare***	DA	
P. interjectum x ***P. vulgare***	AL	
*****Blechnum chilense***	D	1971
Polystichum x ***bicknellii*** (based on 19th century and recent material)	DA	(1980s)
Dryopteris x ***deweveri***	D	c.1945

**Azolla filiculoides*	DA	1985
**Anemone ranunculoides*	L	1975
***Ranunculus sardous* (one site only)	D	1986
R. fluitans x *R. peltatus* (recognised from 19th century specimens)	A	(1986)
R. baudotii (doubtful)	A	1985
Ceratophyllum submersum (first Irish records)	D	1989
Fumaria officinalis subsp. *wirtgenii*	L	1982
Rorippa nasturtium-aquaticum and *R. microphylla* recognised as separate spp.	DAL (both spp.)	(1940s)
R. nasturtium-aquaticum x *R. microphylla*	DAL	1947
Viola reichenbachiana x *V. riviniana*	DAL	1945
V. canina x *V. riviniana*	L	c.1980
V. arvensis x *V. tricolor*	D	n.d.
**Hypericum calycinum*	DA	1977
**Cerastium tomentosum*	DAL	1976
Stellaria pallida	D	1984
**Carpobrotus edulis* (established at one site)	D	1984
**Linum bienne*	*AL*	*1980s*
**Geranium nodosum* (one site)	D	1988
Erodium cicutarium subsp. *dunense*	DAL	(c.1980)
E. glutinosum (*E. lebelii*)	DA	(c.1980)
Ulex europaeus x *U. gallii*	DL	1987
Anthyllis vulneraria subsp. *lapponica* (North coast)	AL	1980's
Potentilla anglica x *P. reptans*	D	1981
P. erecta subsp. *strictissima* (oldest specimen 1841)	DAL	(1989)
**Acaena novae-zelandiae*	D	1971
Rosa pimpinellifolia x *R. caesia* subsp. *caesia* (one site)	A	1986
R. canina x *R. stylosa*	A (D?)	1985

**Crataegus laevigata*	DAL	1980s
C. laevigata x *C. monogyna*	DAL	1980s
Sorbus devoniensis	DL	1982
**Sedum spurium*	DA	1968
**Crassula helmsii* (previously reported only from Co. Armagh in Ireland)	D	1985
***C. tillaea* (one site: first Irish record)	D	1991
**Tellima grandiflora*	AL	1970s
**Tolmiea menziesii*	DA	c.1972
**Peltiphyllum peltatum* (*Darmera peltata*)	DL	1973
**Ribes sanguineum* (much used for hedging in north-east Antrim)	DAL	1976 but planted much earlier
**R. alpinum* (one site)	A	1950s
**Daphne laureola*	DA	1987
Epilobium montanum x *E. obscurum*	L	1938
E. montanum x *E. parviflorum*	A	n.d.
E. brunnescens x *E. ciliatum* (sole Irish site)	A	c.1980
***E. komarovianum*	DA	1941
**Oenothera erythrosepala*	DAL	1975
**Fuchsia magellanica* (widespread but omitted from *FNE1938*)	DAL	n.d.
***Griselinia littoralis*	DAL	1960s
**Cornus sericea*	AL	(1986)
***C. sanguinea*	DAL	(1980s)
Hedera helix sens. strict. and *H. hibernica* differentiated.	DAL (both spp.)	(1983)
**H. colchica* (established at one site)	D	1984
**Heracleum mantegazzianum*	DAL	1945
H. mantegazzianum x *H. sphondylium*	D	1980
**Polygonum amplexicaule* (*Persicaria amplexicaulis*)	DA	c.1974

P. hydropiper (*Persicaria hydropiper*) var. ***densiflorum***	DAL	1982
****P. polystachyum*** (*Persicaria wallichii*)	DAL	1950
****Reynoutria japonica*** (*Fallopia japonica*)	DAL	1950s
R. japonica x ***R. sacchalinensis***	A	1992
*****Fallopia aubertii*** (*Fallopia baldschuanica*) (planted only)	DA	c.1980
*****Rumex alpinus*** (*R. pseudoalpinus*) (sole Irish record, but see extinctions)	A	1957
R. hydrolapathum x ***R. obtusifolius***	L	1986
R. hydrolapathum x ***R. sanguineus***	L	1986
R. hydrolapathum x ***R. crispus***	D	1942
R. crispus x ***R. obtusifolius***	L	1986
R. sanguineus x ***R. obtusifolius***	L	1986
****Soleirolia soleirolii***	DA	1960
*****Alnus incana***	DAL	1938
A. glutinosa x ***A. incana***	L	1988
*****Populus*** x ***canescens***	DAL	n.d.
*****P. nigra***	DAL	n.d.
*****P.*** x ***canadensis***	DAL	1970s
Salix aurita x ***S. caprea***	AL	1980s
S. cinerea subsp. ***cinerea***	DL	1983
S. caprea x ***S. viminalis***	DAL	1983
****S.*** x ***forbyana***	AL	1980s
*****S.*** x ***calodendron***	DAL	1945
****S.*** x ***stipularis***	DAL	1985
S. x ***stipularis*** x ***S. viminalis***	A	1987
*****S. fragilis*** x ***S. pentandra*** =***S.*** x ***meyeriana***	*A*	*1985*
S. aurita x ***S. myrsinifolia***	A	1985
S. caprea x ***S. myrsinifolia***	AL	1984
S. aurita x ***S. repens***	A	1970s
S. cinerea x ***S. repens***	A	1984

S. caprea x *S. repens*	A	1987
**Gaultheria shallon*	D	1978
**Arbutus unedo* (one tree self-sown)	D	1984
**Buddleia davidii* (now very common compared to 1938: not in *FNE1938*)	DAL	n.d.
**Ligustrum ovalifolium* (in rural hedging in Antrim)	A	1987
**Calystegia sylvatica*	DAL	c.1970
C. sepium subsp. *roseata* (1882 specimens)	A	(1980)
**Linaria purpurea*	DA	1968
**Hebe* x *franciscana*	DAL	1970s
Ajuga pyramidalis (Rathlin Island only)	A	before 1972?
**Leycesteria formosa*	DAL	1970s
**Galinsoga parviflora*	DA	1968
**G. ciliata* (*G. quadriradiata*)	D	1968
**Senecio squalidus*	DAL	1964
S. squalidus x *S. viscosus*	A	1991
Senecio jacobaea x *S. cineraria* =*S.* x *albescens*	*A*	*1990*
***Petasites japonicus* (one site: garden relict only)	*D*	*1993*
***Solidago canadensis*	DA	1970
**Aster lanceolatus* (one site)	L	1984
**Erigeron karvinskianus*	DA	1966
***Conyza canadensis*	A	1990
***Crepis setosa* (casual)	L	1991
***C. nicaeensis* (1878 specimen listed erroneously as native in 1992 edition; see extinctions)	D	(1963)
**Elodea nuttallii*	DAL	1987
***Lagarosiphon major*	D	1989
Groenlandia densa	A	1971
Juncus foliosus (1910 specimen)	DAL	(1980s)
J. ranarius (*J. ambiguus* (1894 and 1914 specimens)	DL	(1978))

J. acutiflorus x ***J. articulatus***	DAL	c.1970
****Allium paradoxum***	AL	1980
A. ampeloprasum var. ***babingtonii***	D	1956
****Crocosmia*** x ***crocosmiiflora*** (confused with next in *FNE1938*)	DAL	1970s
*****C. pottsii*** ('good records')	L	1985
*****C.*** x ***paniculata***	L	1987
Epipactis phyllanthes (1865 specimen from the Antrim site)	AL	(1971) (A) 1956 (L)
E. leptochila	A	1979
Coeloglossum viride x ***Dactylorhiza fuchsii*** (one site)	D	1969
Gymnadenia conopsea subsp. ***borealis***	A	1980s
G. conopsea subsp. ***densiflora***	DAL	1946
Dactylorhiza incarnata subsp. ***coccinea***	DL	1960s
D. traunsteineri	A	1946
D. lapponica (two sites)	A	1971
D. fuchsii x ***D. maculata***	DAL	1955
D. fuchsii x ***D. incarnata***	DL	1984
D. fuchsii x ***D. purpurella***	DAL	1955
D. maculata x ***D. purpurella***	DA	1955
D. maculata x ***D. traunsteineri***	A	c.1968
D. purpurella x ***Gymnadenia conopsea***	D	1955
D. maculata x ***G. conopsea***	D	1955
****Lysichiton americanus***	DAL	1956
Carex elata x ***C. nigra***	DA	(1920)
C. rostrata x ***C. vesicaria***	DA	1982?
C. binervis x ***C. hostiana***	A	1938
C. paniculata x ***C. remota***	AL	1945
C. otrubae x ***C. remota***	DA	1945
C. muricata subsp. ***lamprocarpa***	D	1974

Molinia caerulea subsp. ***arundinacea***	D	1991
Glyceria fluitans x ***G. plicata*** (*G. fluitans* x *G. notata*)	DAL	1947
G. declinata	DAL	1947
Festuca tenuifolia var. ***hirtula*** (*F. ovina* subsp. *hirtula*)	DAL	1980s
*****Poa infirma*** (garden weed)	L	1987
****P. palustris***	DAL	1970
Bromus x ***pseudothominei*** (oldest specimen 1894)	DAL	(1989)
Bromus erectus	D	1991
Hierochloe odorata (one site only, sole Irish station)	A	1946
Elymus repens x ***E. farctus*** (*Elytrigia repens* x *E. juncea*) (1894 specimen)	D	(1980s)
E. pycnanthus x ***E. farctus*** (*Elytrigia atherica* x *E.juncea*) (1910 specimen)	A	(1980s)
E. pycnanthus (*Elytrigia atherica*) (oldest specimen 1914)	D	(1980s)
E. repens x ***E. pycnanthus*** (*Elytrigia repens* x *E. atherica*) (oldest specimen 1890)	D	(1980s)
Phleum pratense and ***P. bertolonii*** (both present)	DAL (both spp.)	(1980s)
****Spartina anglica*** (first planted 1929)	D	(1960s)
S.* x ***townsendii* sens. strict. (first planted 1933)	L	1979

TABLE 5. Extensions to the ranges of species since 1938.

Species and Area	**Counties for which taxon is now (1994) recorded**
Equisetum variegatum (extended to Down and Antrim)	DAL
E. x ***litorale*** (now regarded as much more common)	DA
**Sinapis alba* (new to Antrim)	DAL
Teesdalia nudicaulis (new to Londonderry)	DAL
Hypericum hirsutum (two additional 19th century sites discovered in literature and herbarium BEL but see under extinctions)	A (D?)
Halimione portulacoides (*Atriplex portulacoides*) (extension of range northwards)	D
Ulex gallii (new to Londonderry)	DAL
**Rubus spectabilis* (now common and mostly recorded after 1970)	DAL
**Acaena ovalifolia* (mostly recorded after 1950)	DA
**Rosa rugosa* (now much more common after 1946)	DAL
**Sedum album* (much increased since 1945)	DAL
**Ribes rubrum* (infrequently naturalised 1935-7, Praeger; many more 1980s reports)	DAL
**Hippophae rhamnoides* (much increased and some recent plantings)	DAL
**Epilobium brunnescens* (much increased throughout)	DAL
Myriphyllum alterniflorum var. ***americanum*** (outside the Lough Neagh basin only: although apparently virtually extinct in its classical locality of Lough Neagh/Lough Beg (see above), this var. has been found on the Garron Plateau)	DAL
**Bryonia dioica* (*FNE1938* lists as "casual" but established for many years at one site, one new site in Antrim)	DA
**Reynoutria sachalinensis* (*Fallopia sachalinensis*) (much increased)	DAL
**Rhododendron ponticum* (commoner in the wild than in 1938)	DAL
Andromeda polifolia (extended to Londonderry but see declines)	DAL
**Nymphoides peltata* (increasing, probably planted out: see also local extinctions)	DAL
**Calystegia pulchra* (much more common than in 1938;	DAL

new to Down and Londonderry)	
C. sepium subsp. ***roseata*** (one additional site on mainland: 1882 site on Rathlin Island)	A
**Erinus alpinus* (now more widespread)	DAL
Parentucellia viscosa (new to Down and Antrim)	DAL
Galeopsis bifida (more common than single 1898 record suggests in *FNE1938*)	DAL
**Symphoricarpos rivularis* (much increased since 1938)	DAL
**Senecio viscosus* (much increased since c.1970 and new to Londonderry)	DAL
**Petasites fragrans* (much increased generally)	DAL
**Mycelis muralis* (several additional new sites; new to Antrim)	DAL
**Crepis biennis* (spreading)	DA
Potamogeton x *sparganifolius* (new to Down)	DA
P. x *undulatus* (extended to Lough Neagh)	A
P. x *cooperi* (two additional sites)	DA
P. obtusifolius (new to Rathlin Island)	DAL
P. x *nitens* (new to Londonderry and new to Rathlin Island)	DAL
Spiranthes romanzoffiana (range in Antrim extended and new to Down)	DAL
Hammarbya paludosa (new to Down)	*DA*
D. purpurella (frequent)	DAL
Eleocharis uniglumis (more frequent around coast than hitherto thought: new to Antrim)	DAL
Carex magellanica (new to Londonderry)	AL
C. pauciflora (new to Down)	DA
C. acutiformis (new to Antrim)	DA
Glyceria maxima (spread to Lough Neagh and near Corbet Point in Down)	DA

TABLE 6. Species or hybrids so far un-recorded but probably present in area specified.

Equisetum x *litorale*	Not recorded in Londonderry.
Dropteris filix-mas x *D. affinis*	No records in the north-east.
Polypodium cambricum	No convincing vouchers for Londonderry.

TABLE 7. Erroneous or doubtful old records.

Adiantum capillus-veneris	Antrim one site: doubtful and no further reports.
Asplenium* x *clermontiae	Reported for Down in many publications (e.g. Stace, 1975) but site was in Louth.
Rubus chamaemorus	Sometimes reported as being in Londonderry but site is in Tyrone (Sperrins).
Crataegus calycina subsp. ***curvisepala***	Based on an 1893 specimen in DBN from Holywood, Co. Down.
Salix phylicifolia	Reported by D. Moore but no vouchers: see Synnott (1984).
Leontodon hispidus	Persistent reports of this species from the north of Antrim are very dubious and probably refer to a local hairy form of *L. autumnalis* - see *Flora* p. 299.

TABLE 8. Protected species in the north-east of Ireland.

Of the 55 species currently protected under the Northern Ireland wildlife legislation, no less than 45 are recorded as natives in north-eastern Ireland. 18 of these species occur *only* within the three north-eastern counties within Northern Ireland. These are as follows:-

***Ranunculus fluitans*§**	***Melampyrum silvaticum***
Minuartia verna	***Erigeron acer***
Crambe maritima	***Hypochoeris glabra*§**
***Geranium silvaticum*§**	***Centaurium littorale***
***G. pratense*§**	***Eleocharis parvula***
***Hottonia palustris*§**	***Carex buxbaumii*§**
***Adoxa moschatellina*§**	***C. pauciflora*§**
Mertensia maritima	***Calamagrostis epigeios***
Ligusticum scoticum	***Hordelymus europaeus*§**

In addition, the species marked in this list with a § are confined as natives or probable natives to the three north-eastern counties in Ireland as a whole.

TABLE 9. Red Data Book species.

The current vascular plant section of the *Irish Red Data Book* (Curtis and McGough, 1988) lists a total of 160 species for Ireland as a whole. Of these the following occur or have occurred in north-eastern Ireland (in the table, the listing of a species as threatened or vulnerable to habitat change is a subjective assessment by P.H.).

Species	Status at 1994 t = threatened d = declined since 1938 v = vulnerable	**Counties from which recorded after 1970**
Adoxa moschatellina	one site only *tv*	A
Agrostemma githago	extinct	-
Ajuga pyramidalis	extant	A (one site)
Andromeda polifolia	extinct in D *d*	AL
Anthemis arvensis	extinct?	-
Bromus racemosus	extinct at most sites *dv*	L (one 1990 site)
C. pauciflora	long known in A, recent find in D	DA
Calamagrostis stricta	extant, Lough Beg, Lough Neagh only *dv*	AL
C. epigeios	extant *dtv*	L (one site)
Cardamine amara	extant	DAL
Cardamine impatiens	casual only	A
Carduus nutans	casual only	D (one recent record)
Carex magellanica	long known in A, recent find in L	AL
Centaurea cyanus	extinct	-
Centaurium littorale	extant *v*	L (only Irish site)
Cephalanthera longifolia	long extinct	-
Crambe maritima	extant *dv*	D (one site at 1994)
Cryptogramma crispa	extant	DA

Dactylorhiza traunsteineri	extant in A mountains	A
Draba incana	extant *v*	AL (one site A, one area L)
Elatine hydropiper	extant *d*	DAL
Eleocharis parvula	extant	L
Epipactis palustris	extant in L, long-extinct in D, A *v*	L
Epipactis phyllanthes	extant *v*	L (one site)
Equisetum pratense	extant	DAL
Erigeron acer	extant on one dune system	D
Filago minima	several recent reports	AL (seen 1969 in D)
Frangula alnus	extant *v*	DAL
Geranium sylvaticum	extant	A
Gnaphalium sylvaticum	extant but declined	A
Groenlandia densa	abundant at its one site	A (one site)
Gymocarpium dryopteris	suspected gone very recently from its only site *v*	A (one site)
Hammarbya paludosa	long known in A, recent find in D *v*	DA
Hierochloe odorata	extant *v*	A (one site)
Hordelymus europaeus	extinct? last seen 1949	- (one former site)
Hottonia palustris	extant *dv*	D (two sites)
Hyoscyamus niger	extant *d*	D (one site)
Hypericum hirsutum	extinct	-
Hypochoeris glabra	extant *v*	AL (five sites)
Lamiastrum galeobdolon	garden escapes only	DA
Lathyrus palustris	extant by Lough Neagh, extinct in D *v*	A
Ligusticum scoticum	extant *dv*	DAL
Limonium binervosum	extant *v*	D (one site)
Lolium temulentum	extinct casual	-
Melampyrum silvaticum	extant: very rare	AL
Mentha pulegium	extant, Lough Beg only *v*	AL

Mertensia maritima	extant *dv*	DA (several sites)
Monotropa hypopitys	extinct? last seen 1944	L (one former site only)
Neottia nidus-avis	frequent in demesne woods	DAL
Ophrys apifera	extant *v*	DAL (not infrequent)
Orchis morio	extant *v*	D (one site)
Orthilia secunda	extinct?	-
Papaver hybridum	extinct	-
Pilularia globulifera	extinct	-
Poa palustris	introduced and frequent	DAL
Primula veris	prob. not native in north-east	D (one recent site only)
Prunus padus	extant, widespread; (no recent D records of indubitably wild plants)	AL
Pseudorchis albida	extant *d*	A (two sites)
Pyrola media	extant but extinct in D	AL
Ranunculus fluitans	Six Mile Water only, extant *v*	A
Saxifraga aizoides	extant	A (north-east of county only)
S. granulata	not native, sporadic only	A
S. hirculus	extant *dv*	A (one site)
S. oppositifolia	extant	L (one site)
Sanguisorba officinalis	extant *dt*	DA (two sites)
Saussurea alpina	extant	D (one site)
Scandix pecten-veneris	extinct	-
Scrophularia umbrosa	River Bann only	L
Sibthorpia europaea	alien: established in Belfast only	A
Silene acaulis	extant	L (one site - abundant)
Sisyrinchium bermudiana	extinct? but status unclear	-
Spiranthes romanzoffiana	apparently extending its range *v*	DAL
Stachys officinalis	extinct?	-
Teesdalia nudicaulis	extant	DL

Trichomanes speciosum	extant *v*	A (one site, a single plant!)
Vicia lathyroides	extant	DAL
Vicia orobus	extant *dv*	A

PART II

Corrigenda and Addenda

A brief list of corrections and amendments to the Flora is given below.

To Chapter 4, p. 21: the Copeland Bird Observatory is situated on Lighthouse Island (which does not have the present lighthouse!); not on the largest of the Copeland group of islands as stated.

To the 'List of principal collectors and recorders' p. 87:- change the abbreviation given for **NELSON**, E. Charles from **ENC** to **ECN**. The entries in the body of the *Flora* are correct and all records quoted for **ECN** are by Nelson; records quoted for **ENC** are all by **CARROTHERS**, Edward Norman.

Add to list of entries: **TCGR** for **RICH, T. C. G.**

P. 143, for ***Camelina alyssum*** read ****Camelina alyssum***. For ***Camelina*** sp. indet, read ****Camelina*** sp. indet.

P. 144, for ***Descurainia sophia*** read ****Descurainia sophia***.

P. 231, for ***Reynoutria sachalinensis*** read ****Reynoutria sachalinensis***.

P. 286, for ***Senecio squalidus*** read ****Senecio squalidus***.

P. 308, records of ****Pilosella lactucella*** are now known to refer to ****P.* x *floribunda***. See Bowman and Sell (1993).

P. 309, for ***Crepis nicaeensis*** read ****Crepis nicaeensis***.

P. 352, ***Carex pauciflora***: for **-A-** read **DA-**.

P. 371, photo caption: for ***Hierochlöe*** read ***Hierochloë***. Likewise caption to colour plate **X**.

Post-publication Records

For places for which no grid references are given in this list, see the Gazetteer in the *Flora*.

Osmunda regalis. *Flora* p. 102. This fern is abundant in "fen carr" which has developed on

abandoned peat cuttings in Co. Antrim to the south-east of Lough Neagh around the Gawley's Gate and Montiaghs area J0966, J0967; 1993, P. Hackney, Daniel Kelly and Donal Synnott.

Asplenium marinum. *Flora* p. 110. Donaghadee 1994; D. Getty: first post-1888 report from the north of Co. Down and the Ards.

Polystichum aculeatum. *Flora* p. 113. Kilrea Wood C936130, Co. Londonderry, 1993; P. Hackney.

Botrychium lunaria. *Flora* p. 101. Wolf Hill quarry above Ligoniel, Co. Antrim, 1993; S. Beesley and J. Wilde.

****Carpobrotus edulis***. *Flora* p. 159. For an historical account of the spread and taxonomy of this species (with distribution map) see Preston and Sell (1989). This species is scattered along the east and south coasts of Ireland.

****Chelidonium majus***. *Flora* p. 130. Gracehill, Co. Antrim, near churchyard 1993; D. Getty.

Cochlearia danica. *Flora* p. 136. Growing on the central reservation of M1 motorway in squares J16 and J26, Co. Down, 1992; Andrew McMullan; also on the M2 in Co. Antrim.

Hypericum maculatum. *Flora* p. 147. Stone bridge at Carneagh D079332 Co. Antrim, 1991; S. Beesley in **BEL**.

H. humifusum. *Flora* p. 148. Grassy bank at Craigs Churchyard near Cullybackey D045080, Co. Antrim, 1991; S. Beesley in **BEL**.

****Montia sibirica***. *Flora* p. 158. Near Runkerry House, north Antrim coast, in abundance, 1993; D. Honneyman; det. P. Hackney: first north Antrim report.

****Linum bienne*** Miller was omitted from the *Flora*, but D. S. Lambert had reported several instances of this species growing as a casual in the north of the district in the 1980s, prior to the report by R. Anderson and S. Christie of one plant in Portrush (Anderson and Christie, 1991).

Rhamnus catharticus. *Flora* p. 169. Several large trees planted in line in a field boundary hedge at Selshan J084684, Co. Antrim, 1993; P. Hackney, Daniel Kelly and D. Synnott.

****Sanguisorba minor***. *Flora* p. 189, as an extinct species with last record in 1950's. Found in Ligoniel Park 1992 and Alexandra Park 1993 (both Belfast, Co. Antrim); Robert Scott, in **BEL**, first 20th century records for this county, possibly introduced in grass seed mixtures.

Rosa x ***glabra*** (*R.* x *hibernica* var. *glabra*). *Flora* p. 191. Bellair Hill, between Glenarm and

Carnlough, Co. Antrim, 1910; C. H. Waddell: the vouchers for this record have been located recently in **BEL**.

R. rubiginosa. *Flora* p. 194. Among bracken on hillside, Magilligan, Co. Londonderry, 15 July 1896; Charles Bailey in **BEL**.

Sorbus hibernica. *Flora* p. 199. Hollymount, Downpatrick, Co. Down, 21 June 1986; D. L. Kelly, in **BEL**.

Umbilicus rupestris. *Flora* p. 203. Basaltic native rock at Ballygalley Head, Co. Antrim, 1993; D. Ledsham. The entry in the *Flora* for Co. Londonderry is misleading and self-contradictory: the plant is mainly a species of the east of Londonderry (not the west as the introduction to the species account states). It seems unlikely that the acid nature of the rocks in the west of the county could explain its rarity in that part of the county as suggested, bearing in mind that it occurs on similar rock (schist) in western Tyrone and parts of south-east Londonderry. Also, although regarded as a calcifuge, it occurs on basaltic rock in some areas of Antrim and Londonderry, which rock is generally noted as frequently supporting calcicolous species.

Saxifraga tridactylites. *Flora* p. 204. Car park of Wellworth's store at Dundonald, Co. Down in abundance May 1993; J. Wilde.

****Aethusa cynapium***. *Flora* p. 224. By rough track to shore, Rostrevor, J176182, Co. Down, 1992; Ian McNeill. About four plants in Carrickfergus, Co. Antrim in a school playground, 1994; S. Beesley.

****Daphne laureola***. *Flora* p. 209. Knockagh south-west of
Carrickfergus J3686, Co. Antrim, 1986; S. Wolfe-Murphy and A. S. McMullin.

****Epilobium ciliatum***. *Flora* p. 210. The history of the spread of this species in the British Isles was summarised by Preston (1989).

E. brunnescens hybrid at Magheramorne, Co. Antrim in *Flora* p. 210 as ***E. ciliatum*** x ***E. brunnescens***. The parent species apart from *E. brunnescens* was, and remains, uncertain, but D. Getty thought it most likely to be *E. ciliatum* as this was the most frequent erect-growing species in the vicinity: *E. montanum* was absent from the site. In 1994 the **BEL** vouchers were sent to T. D. Pennington at Kew for determination but he was unable to be more definite about the parentage.

Polygonum mite and ***P. minus***. The reference to the work of Parnell and Simpson (1989)

around Lough Neagh was omitted from the *Flora* (see p. 230). They present good evidence for the occurrence of the hybrid between these two species. Material was collected from the Co. Tyrone shore and from Sandy Bay, Co. Antrim. Note that Parnell and Simpson incorrectly cited the name as "Sands Bay" and gave an incorrect grid reference. The correct intended reference would seem to be J1272. The Tyrone site grid reference is also incorrect and should be H9677.

P. campanulatum. *Flora* p. 231. Naturalising in Cregagh Glen J365705, Co. Down, 1993; D. Getty.

****Alnus cordata***. This tree (Italian alder) is planted more widespread than the *Flora* (p. 236) indicated. To the single station add: Cregagh Glen J3670 and closed Co. Down railway at Bloomfield J3773, both in Co. Down, 1993; P. Hackney.

S. fragilis x ***S. pentandra*** (= ***S.*** x ***meyeriana***). Near Antrim town J1485, 1985; J. Harron. In old part of Magheramorne Quarry J429984, Co. Antrim, one tree, 1994; P. Hackney conf. R. D. Meikle.

Pyrola minor. *Flora* p. 248. As well as occurring in Bracknamuckley Wood, this also occurs in the neighbouring Gortgole Wood C9606, Co. Antrim, August 1993; P. Hackney.

****Primula veris***. *Flora* p. 251. Approx. 100 plants in open ground in Belvoir Park, Co. Down, May 1994; G. Coates: first post-1938 record for the north-east of Ireland.

****Nymphoides peltata***. *Flora* p. 255. Dominant species of ponds on closed course of Co. Down railway at Bloomfield J3773, Co. Down, almost certainly planted, August 1993; J. Wilde, S. Beesley and P. Hackney.

Mertensia maritima. In *Flora* p. 258. This species has reappeared at St John's Point, Co. Down - two plants near the lighthouse, 1994; Margaret Marshall.

****Calystegia pulchra***. *Flora* p. 259. Old Kilmore Road near Moira, Co. Down, 1994; D. Getty.

****Lycium chinense***. *Flora* p. 260. Rough Island in northern end of Strangford Lough J495689, Co. Down, 1993; O. Morton.

****Mimulus guttatus*** x ****M. luteus***. In 1978 I collected (**BEL**) a mimulus specimen from a colony beside a stream descending the chalk and basalt cliff at Whiterocks, near Portrush C889407, Co. Antrim, which at the time I identified as *M. guttatus* but which I redetermined as *M. guttatus* x *M. luteus* in 1991. R. Anderson's 1991 record of *M. luteus* from the same locality,

in the *Flora* p. 263 taken from the note by Anderson and Christie (1991), probably also belongs under this hybrid in which case true *M. luteus* remains unreported for the district.

Parentucellia viscosa. *Flora* p. 268. In addition to the sites reported by M. N. Hamilton and J. Davies from the west of the city of Londonderry (in vc H34), Anderson and Christie (1991) reported the plant from Maydown and Lough Enagh Eastern on the eastern fringes of the city in vc H40: this is an area where the plant has been hitherto unseen.

Lamiastrum galeobdolon. *Flora* p. 274. Established large patch beside the demolished bridge over Six Mile Water at Templepatrick J229867, Co. Antrim, 1994; P. Hackney, but first noted here c.1980.

****Petasites japonicus*** (Siebold and Zucc.) Maxim. Masonic temple in Ballymullan Rd, Crawfordsburn J464813, Co. Down, 1993 and 1994; Mrs F. Filmer: specimen coll. PH in **BEL**. First record for north-east Ireland but only a garden relict.

Petasites albus. Grounds of the Throne Hospital, Co. Antrim, 1994; R. Bleakley.

Senecio jacobaea x ***S. cineraria*** (= ***S.*** x ***albescens*** Burb. and Colgan). Base of wall near Albion Mill, Joymount, Carrickfergus, Co. Antrim, July 1990; S. Beesley in **BEL**. First record for north-east Ireland.

Senecio viscosus x ***S. squalidus*** (= ***S.*** x ***subnebrodensis*** Simonkai). With both parents on unsurfaced car park in Belfast J334731, Co. Antrim, 1991; S. Beesley and J. Wilde. First record for north-east Ireland.

Senecio cineraria DC. Two plants from the basalt sea cliff at the Convent, Portstewart C813379, Co. Londonderry, 1991 (Anderson and Christie, 1991). This was the first published record of this species as self-sown in the wild, but the site was already known for some years to the county recorder, D. S. Lambert, but was unnacountably omitted from the *Flora*.

Senecio fluviatilis. Near Downhill, Co. Londonderry, 1952; J. Greer in **BEL**.

Hieracium latobrigorum. *Flora* p. 306. Stone wall at Crockan Bridge D097262, Co. Antrim, 1991; S. Beesley, det. P. Hackney in **BEL**.

****Pilosella*** x ***floribunda*** (Wimm. and Grab.) Arvet-Touvet is reported in the *Flora* p. 308 incorrectly as ***P. lactucella***. Bowman and Sell (1993) refer to the history of this plant in Northern Ireland and report a new British locality in South Hants (vc 11). The plant is thought to be ***P. lactucella*** x ***P. caespitosa*** (Dumort.) P. D. Sell and C. West.

Hammarbya paludosa. *Flora* p. 332. In the hills above Rostrevor, Co. Down, 1992; J. Harron: first Co. Down record.

Epipactis helleborine. *Flora* p. 330. To list of sites add Gortgole Wood C9606, Co. Antrim, 1993: P. Hackney.

Gymnadenia conopsea subsp. ***borealis***. Giant's Causeway, Co. Antrim (Anderson and Christie, 1991). R. Piper reports (*Flora* p. 333) this subspecies (as a var.) from Co. Antrim generally.

****Allium triquetrum***. *Flora* p. 326. Quoile River near Downpatrick, Co. Down, 1993; Eric Rainer.

****A. paradoxum***. *Flora* p. 327. Three-Mile Water Park at Whiteabbey, Co. Antrim, one colony, 1994; F. Wolsey in **BEL**: first record for Co. Antrim.

Eleocharis uniglumis. *Flora* p. 343. Brown's Bay, Islandmagee D4303, 1986; S. Beesley. Craigmacagan Lough, Rathlin Island D1549, 1988; Northern Ireland Lake Survey. First Co. Antrim records.

C. pendula. *Flora* p. 348. In Bracknamuckley Wood C9704, and in abundance, locally dominant, or co-dominant with *Scirpus sylvaticus*, in neighbouring Gortgole Wood C9606, both in Co. Antrim, 1993; P. Hackney.

Scirpus sylvaticus. *Flora* p. 340. Locally dominant, or co-dominant with ***Carex pendula***, in Gortgole Wood, Co. Antrim, 1993; P. Hackney.

Glyceria maxima. *Flora* p. 357. In pond, almost certainly introduced, on closed course of Co. Down railway at Bloomfield J3773, Co. Down, 1993; P. Hackney.

*****Hordeum murinum***. Flora p. 367. Streetside in Portaferry, Co. Down, 1992; Ian McNeill. Whitla St, Belfast, Co. Antrim, 1994; S. Beesley in *BEL*.

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IRISH MICROLEPIDOPTERA CHECK-LIST

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Introduction

Since the publication of Beirne's monograph (1941) on the Irish Microlepidoptera, there have been many further additions to the Irish list, including those contained in the important survey of the Lepidoptera of the Burren, Co. Clare, by Bradley, Mere and Pelham-Clinton, which is summarised in Bradley and Pelham-Clinton (1967). Several other contributions have resulted in the addition of many species new to the Irish fauna. Recent research on Museum specimens has also revealed several previously undetected species as well as a number of misidentifications. Finally, taxonomic work since Beirne (1941) has resulted in a greatly modified nomenclature and also the addition of a number of species as a result of the splitting of taxa previously considered to represent one species. This check-list has been produced in response to the growing need for a comprehensive and up-to-date summary of current knowledge of the Irish Microlepidoptera.

As the Irish lepidopterous fauna can be looked upon as essentially an impoverished version of the British, and as so much of the work on the Lepidoptera has been carried out by lepidopterists resident in Britain, it has been conventional to apply the nomenclature and classification used there. However, the current British check-list of Kloet and Hincks (1972) is now distinctly outdated, and as systematic research by various workers such as Kyrki (1983, 1984), Kristensen (1984) and Nielsen (1989), largely summarised by Scoble (1991), has led to major reappraisals of Lepidoptera classification, it was considered that a more up-to-date check-list should be used as the basis for the present catalogue. The nomenclature and systematic arrangement in the present list are therefore based on the Danish check-list of Schnack *et al.* (1985), with some modifications and including more recent nomenclatural changes. In the Nepticulidae, the arrangement follows Johansson *et al.* (1990).

The Irish Microlepidoptera compared with the British

In *A List of the Microlepidoptera of Ireland*, Beirne (1941), catalogued 709 species, of which 604 were accepted as Irish without reservation, while the remaining 105 were considered either doubtfully Irish, or erroneous. The total of 604 represented 46% of the then known British species of Microlepidoptera. The current check-list contains 793 species whose Irish records are accepted as reliable. This represents 51% of the current British total (see Table 1).

The proportion of British species present shows considerable variation between families, as shown in table 2. The relatively high proportion exhibited by the Elachistidae (70%) probably reflects the relatively extensive and varied range of grassland present in Ireland. The relatively low proportions of Coleophoridae and Gelechiidae present is probably associated with the number of species dependent on deciduous trees in these families, as the number of deciduous woodland insect species present in Ireland is in general markedly lower than in Britain.

Changes in the Microlepidoptera in Ireland

Increases and decreases in distribution, introductions and extinctions are undoubtedly occurring continuously in the Irish Lepidoptera, as in other invertebrate groups. However, with our very incomplete knowledge of the Irish invertebrate fauna, our understanding of these events and processes is distinctly limited. Introductions of new species can, however, be recognised where the species are dependent on foodplants which are not native. For example, the number of species feeding on conifers, e.g. on *Pinus*, *Larix*, *Picea*, *Cupressus* and *Chamaecyparis* has increased steadily, although the species rarely, if ever, approach the pest proportions found in central Europe or Britain. It is very likely that several more species await discovery in coniferous woodland, especially as this habitat is often avoided by field entomologists. One striking example of introduction and increase of range is *Blastobasis lignea* Walsingham, which was described from Madeira in 1894, the earliest known Irish specimens of which date from 1911, and which was not detected in Britain until 1917 (Beirne, 1938). This species how appears to have spread to all parts of Ireland, and is abundant in east and south at least. Other species which appear to have spread, at least temporarily, to Ireland in recent decades include *Cacoecimorpha pronubana* (Hübner) polyphagous, especially on fruit trees, *Cydia molesta* (Busck) (on imported rosaceous fruit), and *Cryptophlebia leucotreta* (Meyrick)

TABLE I. Total number of species in families of Microlepidoptera.

Family	Irish total	British total	Irish % of British spp.
MICROPTERIGIDAE	4	5	80
ERIOCRANIIDAE	8	8	100
OPOSTEGIDAE	2	4	50
NEPTICULIDAE	59	95	63
HELIOZELIDAE	3	5	60
ADELIDAE	11	16	69
INCURVARIIDAE	5	5	100
PRODOXIDAE	3	7	43
TISCHERIIDAE	3	6	50
PSYCHIDAE	4	20	25
TINEIDAE	25	61	41
GRACILLARIIDAE	52	93	56
BUCCULATRICIDAE	9	12	75
YPONOMEUTIDAE	46	79	58
OCHSENHEIMERIIDAE	2	3	67
LYONETIIDAE	7	11	64
GLYPHIPTERIGIDAE	5	7	71
OECOPHORIDAE	42	91	46
ELACHISTIDAE	32	46	70
COLEOPHORIDAE	48*	108	44
AGONOXENIDAE	3	6	50
BATRACHEDRIDAE	1	2	50
MOMPHIDAE	7	14	50
COSMOPTERIGIDAE	6	11	55
SCYTHRIDIDAE	2	12	17
BLASTOBASIDAE	2	8	25
GELECHIIDAE	69	159	43
TORTRICIDAE	222	381	58
CHOREUTIDAE	4	6	67
SCHRECKENSTEINIIDAE	1	1	100
EPERMENIIDAE	3	8	37
ALUCITIDAE	1	1	100
PTEROPHORIDAE	18*	42	43
PYRALIDAE	84	214	39
TOTAL	793	1547	51

* These totals each include one species not found in Britain [*viz. Coleophora pappiferella* Hofmann and *Platyptilia tesseradactyla* (L.)]

TABLE 2. Larger families only, ranked according % of British species present.

Family	Irish total	British total	Irish % of British spp.
ELACHISTIDAE	32	46	70
NEPTICULIDAE	59	95	63
YPONOMEUTIDAE	46	79	58
TORTRICIDAE	222	381	58
GRACILLARIIDAE	52	93	56
OECOPHORIDAE	42	91	46
COLEOPHORIDAE	48	108	44
GELECHIIDAE	69	159	43
TINEIDAE	25	61	41
PYRALIDAE	84	214	39

(on imported *Citrus* fruit) but the last two probably do not breed in the wild here.

In the absence of consistent sampling, decreases both of abundance and distributional area are less readily detected. There does, however, appear to be a decrease in the abundance of species feeding partly or wholly on dead or decaying wood, or associated fungi. Of the seven species in this category which have been recorded from Ireland, there are few recent records of the tineids *Nemapogon clematella* (Fabricius) and *Triaxomera fulvimitrella* (Sodoffsky), while *Morophaga choragella* (Zeller) and *Nemaxera betulinella* (Paykull), recorded in the middle of the last century are now considered doubtfully Irish. There are also few, if any recent records of the oecophorids *Alabonia geoffrella* (L.), *Schiffermuelleriella similella* (Hübner) and *Batia lambdella* (Donovan).

Arrangement of check-list

In the present check-list, species whose Irish occurrence is believed to be adequately documented are listed systematically in the first section. In the second section doubtful or erroneous records are dealt with. Numbered references in the right-hand column refer to the third section of the list, where details such as first published reference, mis-identifications, taxonomic and nomenclatural changes are provided. Each family name is followed in brackets by the number of Irish species included.

Irish Microlepidoptera check-list

(synonyms are indented below species name)	**Notes**
ZEUGLOPTERA	
MICROPTERIGOIDEA	
Micropterigidae (4)	
Micropterix Hübner, 1825	
- *mansuetella* Zeller, 1844	1
- *aureatella* (Scopoli, 1763)	
- *aruncella* (Scopoli, 1763)	
- *calthella* (Linnaeus, 1761)	
GLOSSATA	
ERIOCRANIOIDEA	
Eriocraniidae (8)	
Dyseriocrania Spuler, 1910	
- *subpurpurella* (Haworth, 1828)	
Heringocrania Kuznetsov, 1941	
- *chrysolepidella* (Zeller, 1851)	2
- *unimaculella* (Zetterstedt, 1839)	3
Eriocrania Zeller, 1851	
- *sparrmannella* (Bosc, 1791)	
- *salopiella* (Stainton, 1854)	3
- *haworthii* Bradley, 1966	3
- *sangii* (Wood, 1891)	3
- *semipurpurella* (Stephens, 1835)	3
NEPTICULOIDEA	
Opostegidae (2)	
Opostega Zeller, 1839	
- *salaciella* (Treitschke, 1833)	
- *crepusculella* Zeller, 1839	

Nepticulidae (59)

Enteucha Meyrick, 1915

- *acetosae* (Stainton, 1854)

Stigmella Schrank, 1802

- *lapponica* (Wocke, 1862) 4
- *confusella* (Wood, 1894) 5
- *betulicola* (Stainton, 1856) 6
- *luteella* (Stainton, 1857) 7
- *glutinosae* (Stainton, 1858) 8
- *microtheriella* (Stainton, 1854) 9
- *malella* (Stainton, 1854)
- *catharticella* (Stainton, 1853) 10
- *anomalella* (Goeze, 1783)
- *spinosissimae* (Waters, 1928) 11
- *ulmivora* (Fologne, 1860) 12
- *paradoxa* (Frey, 1858) 13
- *crataegella* (Klimesch, 1936)
- *magdalenae* (Klimesch, 1950) 14
  nylandriella sensu auctt.
- *nylandriella* (Tengström, 1848) 15
  aucupariae (Frey, 1857)
- *oxyacanthella* (Stainton, 1854) 16
- *hybnerella* (Hübner, 1796)
  gratiosella (Duponchel, 1842)
- *floslactella* (Haworth, 1828) 17
- *tityrella* (Stainton, 1854) 18
- *salicis* (Stainton, 1854) 19
  auritella (Skåla, 1932) 20
- *myrtillella* (Stainton, 1857) 21
- *zelleriella* (Snellen, 1875) 22

repentiella (Wolff, 1959)

- *obliquella* (Heinemann, 1862) 23
- *trimaculella* (Haworth, 1828) 24
- *sorbi* (Stainton, 1861)
- *plagicolella* (Stainton, 1854)
- *lemniscella* (Zeller, 1839)

marginicolella (Stainton, 1853)

- *continuella* (Stainton, 1856) 25
- *aurella* (Fabricius, 1775)

fragariella (Heyden, 1862) 26

- *auromarginella* (Richardson, 1890) 27
- *splendidissimella* (Herrich-Schäffer, 1855)

dulcella (Heinemann, 1862) 28

- *aeneofasciella* (Herrich-Schäffer, 1855) 29
- *dryadella* (Hofmann, 1868) 30
- *poterii* (Stainton, 1857)

serella (Stainton, 1888) 31

- *filipendulae* (Wocke, 1871) 32
- *ulmariae* (Wocke, 1879) 33
- *perpygmaeella* (Doubleday, 1859) 34

pygmaeella (Haworth, 1828), nec (Hübner, 1813)

- *hemargyrella* (Kollar, 1832) 35
- *svenssoni* (Johansson, 1971) 36
- *ruficapitella* (Haworth, 1828) 37
- *atricapitella* (Haworth, 1828) 38

Trifurcula Zeller, 1848

- *cryptella* (Stainton, 1856) 39
- *eurema* (Tutt, 1899) 40
- *immundella* (Zeller, 1839)
- *subnitidella* (Duponchel, 1843) 41

griseella Wolff, 1957

Bohemannia Stainton, 1859

- *quadrimaculella* (Boheman, 1853)

- *pulverosella* (Stainton, 1849) 42

Ectoedemia Busck, 1907

- *septembrella* (Stainton, 1849)

- *intimella* (Zeller, 1848) 43

- *argyropeza* (Zeller, 1839) 44

- *albifasciella* (Heinemann, 1871) 45

- *subbimaculella* (Haworth, 1828) 46

- *angulifasciella* (Stainton, 1849) 47

- *atricollis* (Stainton, 1857) 48

- *arcuatella* (Herrich-Schäffer, 1855) 49

- *rubivora* (Wocke, 1860) 50

- *occultella* (Linnaeus, 1767)

argentipedella (Zeller, 1839)

- *minimella* (Zetterstedt, 1839) 51

woolhopiella (Stainton, 1887)

mediofasciella sensu auctt.

INCURVARIOIDEA

Heliozelidae (3)

Heliozela Herrich-Schäffer, 1853

- *sericiella* (Haworth, 1828)

- *resplendella* (Stainton, 1851) 52

- *hammoniella* Sorhagen, 1885 53

Adelidae (11)

Nematopogon Zeller, 1839

- *schwarziellus* Zeller, 1839

panzerella sensu auctt.

- *magna* (Zeller, 1878) 54

variella Brandt, 1937

pilella ([Denis & Schiffermüller], 1775) partim

- *metaxella* (Hübner, 1796)

- *swammerdamella* (Linnaeus, 1758)

Nemophora Illiger & Hoffmannsegg, 1798

- *cupriacella* (Hübner, 1819)

- *minimella* ([Denis & Schiffermüller], 1775)

- *degeerella* (Linnaeus, 1758)

Adela Latreille, 1796

- *cuprella* ([Denis & Schiffermüller], 1775) 55

- *reaumurella* (Linnaeus, 1758)

viridella (Scopoli, 1763)

- *croesella* (Scopoli, 1763) 56

Cauchas Zeller, 1839

- *rufimitrella* (Scopoli, 1763)

Incurvariidae (5)

Phylloporia Heinemann, 1870

- *bistrigella* (Haworth, 1828)

Incurvaria Haworth, 1828

- *praelatella* ([Denis & Schiffermüller], 1775)

- *oehlmanniella* (Hübner, 1796)

- *pectinea* Haworth, 1828

zinckenii (Zeller, 1839)

- *masculella* ([Denis & Schiffermüller], 1775)

muscalella (Fabricius, 1787)

Prodoxidae (3)

Lampronia Stephens, 1829

- *luzella* (Hübner, 1817)

- *pubicornis* (Haworth, 1828) 57

- *corticella* (Linnaeus, 1758)

rubiella (Bjerkander, 1781)

TISCHERIOIDEA

Tischeriidae (3)

Tischeria Zeller, 1839

- *ekebladella* (Bjerkander, 1795)

complanella (Hübner, 1817)

- *dodonea* Stainton, 1858 58

- *marginea* (Haworth, 1828)

TINEOIDEA

Psychidae (4)

Diplodoma Zeller, 1852

- *laichartingella* (Goeze, 1783) 59

herminata (Geoffroy, 1785)

marginepunctella (Stephens, 1835)

Luffia Tutt, 1899

- *ferchaultella* (Stephens, 1850) 60

lapidella sensu Beirne, 1941

Psyche Schrank, 1801

- *casta* (Pallas, 1767)

Epichnopterix Hübner, 1825

- *plumella* ([Denis & Schiffermüller], 1775) 61

pulla (Esper, 1785)

Tineidae (25)

Dryadaula Meyrick, 1893

- *pactolia* Meyrick, 1902 62

Psychoides Bruand, 1847

- *verhuella* Bruand, 1847 63

- *filicivora* (Meyrick, 1937)

Haplotinea Diakonoff & Hinton, 1956

- *insectella* (Fabricius, 1794)

Infurcitinea Spuler, 1910
- *argentimaculella* (Stainton, 1849)
- *albicomella* (Stainton, 1851)
  Tinea confusella sensu auctt.
Nemapogon Schrank, 1802
- *granella* (Linnaeus, 1758) 64
- *cloacella* (Haworth, 1828)
- *ruricolella* (Stainton, 1849)
- *clematella* (Fabricius, 1781) 65
  arcella sensu auctt.
Triaxomera Zagulyaev, 1962
- *fulvimitrella* (Sodoffsky) 66
Monopis Hübner, 1825
- *laevigella* ([Denis & Schiffermüller], 1775)
  rusticella (Hübner, 1796)
- *weaverella* (Scott, 1858) 67
- *crocicapitella* (Clemens, 1859) 68
- *imella* (Hübner, 1813) 69
Trichophaga Ragonot, 1894
- *tapetzella* (Linnaeus, 1758)
Tineola Herrich-Schäffer, 1853
- *bisselliella* (Hummel, 1823)
Niditinea G. Petersen, 1957
- *fuscella* (Linnaeus, 1758)
  fuscipunctella (Haworth, 1828)
Tinea Linnaeus, 1758
- *pellionella* (Linnaeus, 1758)
- *dubiella* Stainton 1859 70
  turicensis Müller-Rutz, 1920
- *flavescentella* Haworth, 1828

- *pallescentella* Stainton, 1851
- *semifulvella* Haworth 1828
- *trinotella* Thunberg, 1794
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- *heegeriella* (Zeller, 1846)
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- *angustea* (Curtis, 1827)
- *lineola* (Curtis, 1827)

- *delunella* (Stainton, 1849)
  vandaliella (Herrich-Schäffer, 1851)
  resinella sensu auctt.
  resinea sensu Beirne, 1941

Evergestis Hübner, 1825

- *forficalis* (Linnaeus, 1758)
- *pallidata* (Hufnagel, 1767)
  straminalis (Hübner, 1793)

Pyrausta Schrank, 1802

- *purpuralis* (Linnaeus, 1758)
- *ostrinalis* (Hübner, 1796) 267
- *sanguinalis* (Linnaeus, 1767)
- *despicata* (Scopoli, 1763)
  cespitalis ([Denis & Schiffermüller], 1775)
- *cingulata* (Linnaeus, 1758)

Microstege Meyrick, 1890

- *pandalis* (Hübner, 1825)

Ostrinia Hübner, 1825

- *nubilalis* (Hübner, 1796) 268

Eurrhypara Hübner, 1825

- *hortulata* (Linnaeus, 1758)

Perinephela Hübner, 1825

- *lancealis* ([Denis & Schiffermüller], 1775)

Phlyctaenia Hübner, 1825

- *coronata* (Hufnagel, 1767)
  sambucalis ([Denis & Schiffermüller], 1775)

Anania Hübner, 1823

- *funebris* (Ström, 1768)

Ebulea Doubleday, 1849

- *crocealis* (Hübner, 1796)

Opsibotys Warren, 1890

- *fuscalis* ([Denis & Schiffermüller], 1775)

Udea Guenée, 1845

- *lutealis* (Hübner, 1809)

elutalis sensu auctt.

- *prunalis* ([Denis & Schiffermüller], 1775)

nivealis (Fabricius, 1781)

- *olivalis* ([Denis & Schiffermüller], 1775)

- *ferrugalis* (Hübner, 1796)

Mecyna Doubleday, 1849

- *asinalis* (Hübner, 1819) 269

Nomophila Hübner, 1825

- *noctuella* ([Denis & Schiffermüller], 1775)

Pleuroptya Meyrick, 1890

- *ruralis* (Scopoli, 1763)

Palpita Hübner, 1808

- *unionalis* (Hübner, 1796) 270

Erroneous records and species of doubtful status

Nepticulidae

***Stigmella roborella* (Johansson, 1971)**

Although Emmet (1975b, 1981) suggests that this species is likely to occur in Ireland, there are no confirmed records.

***Ectoedemia heringi* (Toll, 1934) (*quercifoliella* (Toll, 1937))**

In KGMB notes there is a reference to a tenanted mine of *E. heringi* on *Quercus*, Ross Island, V946884 [North Kerry], 16.x.1986. As this leaf-mine has not been critically checked the record is considered unconfirmed. Emmet (1975b) points out that Beirne (1945b) illustrates the male genitalia of *E. quercifoliae* (Toll) under the name *subbimaculella* (Haworth), thereby suggesting that the species is likely to occur in Ireland.

Adelidae

***Nemophora metallica* (Poda, 1761) (*scabiosella* (Scopoli, 1763))**

According to R. P. Knill-Jones (pers. comm. 1986) there is a specimen in the King collection in Glasgow University, containing mostly Irish specimens (ex Salvage? coll.) but without data.

Prodoxidae

***Lampronia capitella* (Clerck, 1759)**

Beirne (1941) considered that confirmation of the occurrence of this species in Ireland was desirable.

***Lampronia morosa* (Zeller, 1852) (*quadripunctella* sensu Beirne, 1941)**

Beirne (1941) treated Birchall's (1866-67) record as doubtful pending confirmation.

Psychidae

***Dahlica triquetrella* (Hübner, 1813) (*Solenobia triquetrella* (Hübner, 1813))**

According to Beirne (1941) there is uncertainty about the identity of the Irish specimens referred to under this name.

***Psyche crassiorella* (Bruand, 1851)**

Beirne (1941) doubted the validity of Greer's record of this species from Tyrone, but later stated that the record was correct, the specimen having been seen by Burrows (Beirne, 1942). The records of this species (as *Fumea intermediella* Bruand) by Kane (1901, 1907) appear to have been transposed to *Psyche casta* (Pallas) by Beirne (1941). In view of the fact that no Irish

record of this species is indicated by either Hättenschwiler (1985) or Emmet (1991a), the Irish status of this species is here considered unconfirmed.

Tineidae

***Morophaga choragella* ([Denis & Schiffermüller], 1775)**

Beirne (1941) considered that the Irish record of this species (as *Scardia boleti* (Fabricius, 1777)) was doubtful, although it is accepted by Emmet (1991a).

***Lichenivora nigripunctella* (Haworth, 1828)**

The Irish record of this species was considered doubtful by Beirne (1941) and Pelham-Clinton (1985b).

***Nemaxera betulinella* (Paykull, 1785)**

For this species (as *Tinea corticella* Curtis) Hogan (1855) recorded "Dublin; in houses", and this record was accepted by Beirne (1941). However, Pelham-Clinton (1985b) treats the record in Beirne (1941) as unconfirmed.

***Monopis obviella* ([Denis & Schiffermüller], 1775)**

Beirne's (1941) records of this species (as *M. ferruginella* (Hübner)) refer to *Monopis crocicapitella* (Clemens), *q. v.*

Gracillariidae

***Caloptilia hemidactylella* ([Denis & Schiffermüller], 1775)**

Beirne (1941) casts doubt on an old Irish record, and this seems fully justified in view of the fact that it is exceedingly rare in Britain (Emmet, 1985), and feeds on a plant (*Acer pseudoplatanus* L.) not indigenous to Ireland.

***Phyllonorycter lantanella* (Schrank, 1802)**

The record in Beirne (1941) is based on a misdetermination (Emmet, 1985). Dissection showed the specimen to be a female *Phyllonorycter mespilella* (Hübner) (Bond, in press).

***Phyllonorycter schreberella* (Fabricius, 1781)**

Beirne (1941) considered that confirmation of the record in Birchall (1866-67) was desirable, and Emmet (1985) treats it as unconfirmed.

Douglasiidae

***Tinagma ocnerostomella* (Stainton, 1850)**

Beirne (1941) considered Birchall's record (1866-67) as doubtful. There have been no further

records.

Yponomeutidae

***Zelleria phillyrella* Millière, 1868**

Barrett (1900) recorded *Z. phillyrella* from West Galway, and the record is repeated in Kane (1901), but Beirne (1941) removed it from the Irish list. However, *Z. phillyrella* is now considered to be a junior synonym of *Z. hepariella* Stainton.

***Scythropia crataegella* (Linnaeus, 1767)**

Beirne (1941) considered that the Irish record of this species was unreliable.

***Ypsolopha sylvella* (Linnaeus, 1767)**

Beirne (1941) considered that this species was doubtfully Irish.

Glyphipterigidae

***Glyphipterix minorella* (Snellen, 1882) (*equitella* sensu auctt.)**

This species is recorded as Irish in Pelham-Clinton (1985a). However, the Antrim record was considered doubtful by Beirne (1941), and the North Kerry record in Pelham-Clinton (*loc. cit.*) is probably based on a misdetermination (Bond, unpubl.).

***Glyphipterix fuscoviridella* (Haworth, 1828)**

Beirne (1941) referred to a misdetermined specimen of *G. thrasonella* (Scopoli) under this name, and considered that confirmation of the Irish status of this species was desirable. There have been no further Irish records.

Oecophoridae

***Semioscopis avellanella* (Hübner, 1793)**

Beirne (1941) considers that this species is very doubtfully Irish.

***Depressaria discipunctella* Herrich-Schäffer, 1854**

Beirne (1941) refers to a record by Kane, but considers it doubtful, pointing out that there is no specimen in the Kane collection. According to Emmet (1991a) there is no recent British record.

***Depressaria depressana* (Fabricius, 1775) (*D. depressella* (Hübner, 1813))**

Beirne (1941) reports that the specimen was doubtfully identified as this species. There are no British records since the 19th century (Emmet, 1991a).

***Agonopterix nanatella* (Stainton, 1849)**

Beirne (1941) wrote that confirmation of nineteenth-century records from the "Dublin coast" was desirable. The species is accepted as Irish in Emmet (1991a), but in the absence of other records, and the fact that the species is reported to occur in calcareous habitats (*loc. cit.*), it is treated as only doubtfully Irish.

***Agonopterix scopariella* (Heinemann, 1870)**

Kane (1901) wrote "Letterfrack (C. T. C[rutwell])", but this record is not found in Beirne (1941). As no specimens have been traced and there have been no further records the species is considered only doubtfully Irish.

***Agonopterix pulverella* (Hübner, 1825)**

Beirne (1941) considered that this species (as *A. atomella* Schiff.) was doubtfully Irish. The foodplant, *Genista tinctoria*, does not occur in Ireland.

***Pseudatemelia flavifrontella* ([Denis & Schiffermüller], 1775)**

The records of this species in Beirne (1941) refer to *Pseudatemelia josephinae* (Toll), *q. v.*

Elachistidae

***Stephensia brunnichella* (Linnaeus, 1767)**

The record was based on a misdetermination of a male specimen of *Elachista gleichenella* (Fabricius) in the Murray collection in TCD (det. Bond).

***Elachista pollinariella* Zeller, 1839**

Kane (1901) repeats the Birchall (1866-67) record of this species from Howth, Co. Dublin. However, British records of this species are now considered to refer to *E. subocellea* (Stephens), a species which has recently been recorded from Howth (Bond, unpubl.).

***Elachista collitella* (Duponchel, 1843)**

Beirne (1941) considered the single Irish record by Hodgkinson (1868) doubtful. *E. collitella* was later synonymised with *E. subocellea* (Stephens) (Kloet and Hincks, 1972), but is now again considered a good species (Emmet, 1991a). In view of the fact that no specimen has been traced, and the possibility of confusion with the very similar *E. subocellea*, found in the same locality, *E. collitella* is considered to be only doubtfully Irish.

***Elachista triseriatella* Stainton, 1854**

Recorded from Howth by Birchall (1866-7), but Beirne (1941) transposed the record to *E.*

dispunctella (Duponchel), and treated it as doubtful. The Hogan specimens have not been traced. More recently specimens collected from the same locality have been determined as *E. cahorsensis* Traugott-Olsen, *q. v. E. triseriatella* is now considered to be a European species not recorded from Britain or Ireland.

***Elachista bedellella* (Sircom, 1848)**

Beirne (1941) considers one Irish record doubtful, and reports the other as a misdetermination.

Coleophoridae

***Metriotes lutarea* (Haworth, 1828) (*modestella* Duponchel)**

Beirne (1941) considered the Irish record doubtful.

***Coleophora coracipennella* (Hübner, 1796)**

It is not known whether the records referred to under *Eupista nigricella* Stephens in Beirne (1941) refer to *C. spinella* (Schrank) or *C. coracipennella*, but no Irish specimens of the species currently known as *C. coracipennella* have been traced.

***Coleophora albitarsella* Zeller**

This species is recorded from region "I" (Munster) in Emmet (1991a), apparently in error, as no Irish record has been traced.

***Coleophora vitisella* Gregson, 1856**

Barrett (1861a) recorded this species from Powerscourt, Co. Wicklow in May, but Beirne (1941) considers the Irish record doubtful, with Birchall's record (1866) probably being a repetition of Barrett's. Emmet (1991a) gives June to July as the flight period.

***Coleophora vibicella* Hübner**

Beirne (1941) considers the single Irish record "very doubtful". The foodplant, *Genista tinctoria* L., does not occur naturally in Ireland.

***Coleophora argentula* Zeller**

Beirne (1941) removed this species from the Irish list, the specimens upon which it was based being misidentified *Elachista argentella* (Clerck). It has not proved possible to trace the origin of the record of *C. argentula* (Stephens) from area "I" (Munster) in Emmet (1991a).

***Coleophora sternipennella* (Zetterstedt, 1839)**

The record from area "I" (Munster) in Emmet (1991a) is erroneous (Emmet, pers. comm.).

***Coleophora vestianella* (Linnaeus, 1758) (as *Eupista laripennella* Zeller)**

There are no confirmed Irish records of this species. In the light of more recent Irish records of this species-complex, it seems likely that most or all of the records under *C. laripennella* (Zetterstedt) refer to *C. saxicolella* (Duponchel).

***Coleophora artemisicolella* Bruand 1855**

Beirne (1941) suggests that this species may have been confused with *C. artemisiella* Scott by Kane (1901) and places it in the "doubtful" category. No Irish specimen has been traced.

***Coleophora artemisiella* Scott, 1861**

Beirne (1941) accepts the 19th century records of this species, but in view of the scarcity of its food-plant (*Artemisia maritima* L.), and the possible confusion with *C. artemisicolella*, the Irish status is considered unconfirmed.

Agonoxenidae

***Chrysoclysta linneella* (Clerck, 1759)**

Beirne (1941) considers this species doubtfully Irish, pointing out that the foodplant, *Tilia*, is not native in Ireland.

Momphidae

***Mompha lacteella* (Stephens, 1834)**

Beirne (1941) describes the Irish status of this species as "very doubtful".

Cosmopterigidae

***Sorhagenia rhamniella* (Zeller, 1839)**

Beirne (1941) recorded *S. rhamniella* in July and August from Kerry. Bradley (1963) and Wakely (1966) showed that British records of *rhamniella* referred to three different species, *viz.*, *S. rhamniella*, *S. lophyrella* (Douglas) and *S. janiszewskae* Riedl. As Beirne's specimens have not been traced, his record of *S. rhamniella* must therefore be considered unconfirmed.

Scythrididae

***Scythris fuscoaenea* (Haworth, 1828)**

Beirne (1941) described the Irish status as "doubtful".

***Scythris fletcherella* Meyrick, 1928**

Beirne (1941) described the Irish record as "not reliable".

Gelechiidae

***Metzneria aestivella* Zeller, 1839 (as *M. carlinella* Stainton)**

Beirne (1941) considered that the record based on the Russ Specimen in NMI required confirmation. The moth, bearing the locality label 'Sligo', is correctly identified (genitalia checked KGMB), but some specimens in the Russ collection may not be of Irish origin, even where they bear Irish locality labels.

***Chrysoesthia drurella* (Fabricius, 1775) (*hermannella* auctt.)**

(as *Aristotelia hermannella* Fabricius)

Beirne (1941) considered the Irish status of this species to be doubtful.

***Recurvaria leucatella* (Clerck, 1759)**

Beirne (1941) doubted the reliability of Dillon's record quoted in Kane (1901). The validity of all Dillon's records is now considered very dubious (see O'Connor, 1981).

***Teleiodes sequax* (Haworth, 1828)**

Beirne (1941) wrote "confirmation is desirable" with reference to Birchall's (1866-67) record from Belfast. As the foodplants (*Helianthemum canum* (L.) Baumg. and *H. nummularium* (L.) Miller) are unknown in that area, its occurrence there seems very improbable.

***Bryotropha affinis* (Haworth, 1828)**

A specimen in NMI labelled "Sligo" and "Female" is a male *Teleiodes fugitivella* (Zeller) (genitalia checked KGMB), while a specimen labelled "Donabate", Co. Dublin, in the Beirne collection is *Bryotropha umbrosella* (Zeller) (det. Karsholt). A further specimen labelled "Sligo" and "87/91" is correctly named (Karsholt, *in litt.*), but in view of the uncertainty about the origin of the Russ specimens in NMI, the Irish status of this species is considered uncertain.

***Scrobipalpa suaedella* (Richardson, 1893)**

The record of this species (as *Phthorimaea suaedella*) in Bradley (1953b) is incorrect and refers to *S. samadensis plantaginella* (Stainton) (Bradley and Pelham-Clinton, 1967).

***Scrobipalpa salinella* (Zeller, 1847)**

Beirne (1941) treats the record (as *Phthorimaea salicorniae* Hering) quoted in Kane (1901) as doubtful.

***Syncopacma vinella* (Bankes, 1898) (as *Stomopteryx coronilella* Treitschke)**

The older records under this name could refer to either *S. vinella* or *S. sangiella* (Stainton),

but as the former is a rare species in Britain, known only from Sussex, it can probably be safely excluded from the Irish list.

***Pexicopia malvella* (Hübner, 1805)**

Beirne (1941) considered that confirmation of the record in Lucas (1936) (As *Platyedra malvella* Hübner) was desirable. In view of the fact that there are no further records, the status is still considered doubtful.

Tortricidae

***Pandemis cinnamomeana* (Treitschke, 1830)**

Beirne (1941) considered the record of this species to be doubtful.

***Choristoneura diversana* (Hübner, 1817)**

Beirne (1941) considered the record of this species to be "rather doubtful".

***Isotrias rectifasciana* (Haworth, 1811) (as *Isostrias* (*sic*!) *trifasciana* Donovan)**

Beirne (1941) considered that confirmation of the occurrence of this species in Ireland was desirable.

***Acleris shepherdana* (Stephens, 1852)**

Beirne (1941) removed this species from the Irish list.

***Acleris umbrana* (Hübner, 1799)**

Beirne (1941) considered an old Irish record of this species to be "very doubtful, and probably incorrect".

***Acleris maccana* (Treitschke, 1835)**

Beirne (1941) considered the Irish record of this species to be "not particularly reliable" and describes its Irish status as "doubtful".

***Aethes hartmanniana* (Clerck, 1759)**

Beirne (1942) transferred the records for *Apotomis lineana* ([Denis & Schiffermüller]) in Beirne (1941) to this species. However, these records are now considered to refer to *Aethes piercei* Obraztsov. Similarly, records of *A. hartmanniana* in Bradley and Pelham-Clinton (1967) and Emmet (1968) refer to *A. piercei*.

***Aethes dilucidana* (Stephens, 1852) (as *Lozopera dulicidana* (*sic*!) Stephens)**

The records of this species are considered by Beirne (1941) to be "doubtful".

***Eupoecilia ambiguella* (Hübner, 1796)**

Records of this species refer to *Eupoecilia angustana* (Hübner) (Beirne, 1941).

***Cochylidia implicitana* (Wocke, 1856)**

Beirne (1941) considered this species to be "very doubtfully Irish".

***Cochylis roseana* (Haworth, 1811)**

Records of this species (as *Phalonia roseana* Haworth) refer to *Falseuncaria ruficiliana* (Haworth) (Beirne, 1941).

***Cochylis hybridella* (Hübner, 1813)**

Beirne (1941) considered Birchall's record (1866-67) from Howth, Co. Dublin, to be doubtful pending confirmation. The indication of occurrence in area "J" (Connaught) in Emmet (1991a) appears to be erroneous.

***Celypha rufana* (Scopoli, 1763)**

Huggins (1950) removed this species from the Irish list. Beirne (1942) in his additions and amendments to Beirne (1941) had indicated that he accepted the record of this species (Greer, 1926). However, Huggins (*loc. cit.*) identified the specimen upon which the record was based as a "worn specimen of the brown form of [*Orthotaenia*] *ericetana* [= *Endothenia trifoliana* (Herrich-Schäffer, 1851)]".

***Olethreutes metallicana* (Hübner, 1799)**

Beirne (1941), referring to three 18th-century records, has "confirmation is desirable".

***Hedya salicella* (Linnaeus, 1758)**

Beirne (1941) has "confirmation is desirable". There are several specimens in NMI labelled "Sligo", however these come from the Russ collection, and may therefore not be of Irish origin.

***Apotomis lineana* ([Denis & Schiffermüller], 1775)**

Beirne (1942) removed this species from the Irish list by transferring the records to *Aethes hartmanniana* ([Denis & Schiffermüller] (*q.v.*). However, Bradley *et al.* (1979) appear to have overlooked this.

***Apotomis sauciana* (Frölich, 1828)**

Beirne (1941) considered that Irish records of this species (as *Argyroploce sauciana* Hübner) were doubtful. Beirne (*loc. cit.*) also considered that Irish records of *Apotomis sauciana*

grevillana (Curtis), which he treated as a separate species (*Argyroploce grevillana* (Curtis)), were doubtful.

***Endothenia gentianaeana* (Hübner, 1799)**

The records of this species from the Burren in Bradley and Pelham-Clinton (1967) are erroneous, and refer to *Endothenia marginana* (Haworth) (Bradley *et al.*, 1979). Beirne (1941) suggests that older records of this species (as *E. gentianana*) may refer to *E. oblongana* (Haworth), but it seems more likely that these refer to *E. marginana* (Haworth), *q. v.*

***Endothenia oblongana* (Haworth, 1811)**

Beirne's (1941) and Huggins' (1953) records of this species appear to refer to *Endothenia marginana*. A record of "*Endothenia sellana* Hubn." which Beirne (1941) considered "not very reliable" may also refer to *E. marginana*. According to Bradley *et al.* (1979), *E.oblongana* (Haworth) is "unknown from Ireland".

***Endothenia ustulana* (Haworth, 1811)**

Bradley *et al.* (1979) state that the Irish records of this species are unconfirmed, but it appears that their remark should refer to *Lobesia abscisana* (Doubleday), (*fuligana* sensu Haworth), *q. v.*, as no Irish records of *E. ustulana* have been traced.

***Lobesia abscisana* (Doubleday, 1845) (as *Polychrosis fuligana* (Haworth)**

Beirne (1941) described the Irish records of this species as "doubtful".

***Ancylis diminutana* (Haworth, 1811)**

Beirne's (1941) records under this name probably refer either to *A. geminana* (Donovan) or *A. subarcuana* (Douglas), or to both (see Emmet, 1971).

***Ancylis paludana* (Barrett, 1871)**

Beirne (1941) considered the single Irish record of this species to be "doubtful until confirmation is available".

***Ancylis apicella* ([Denis & Schiffermüller], 1775)**

Beirne (1941) considered that Birchall's record (1866-67) of this species (as *Phoxopteryx siculana*) from Killarney, Co. Kerry was in need of confirmation.

***Epinotia demarniana* (Fischer von Röslerstamm, 1840)**

Beirne (1941) removed this species from the Irish list.

***Epinotia nigricana* (Herrich-Schäffer, 1851)**

The record in Bradley *et al.* (1979) is based on a misdetermination of a specimen of *Zeiraphera griseana* (Hübner), and this species should therefore be removed from the Irish list (Bond, 1994).

***Rhopobota ustomaculana* (Curtis, 1831)**

Beirne (1941) quoted a record of this species in the Russ collection (Kane, 1901), but considered that confirmation was desirable.

***Eucosma conterminana* (Herrich-Schäffer, 1851)**

The record in the Burren list (Bradley and Pelham-Clinton, 1967) is erroneous, being based on a misidentification of *E. cana* (Haworth) (Bradley, pers. comm).

***Thiodia citrana* (Hübner, 1799)**

Beirne (1941) considered that confirmation of the Irish occurrence of this species was desirable. There are no further records.

***Eucosmomorpha albersana* (Hübner, 1813) (as *Eucosma rheediana* (Haworth)**

Beirne (1941) considered that confirmation of the record of this species was desirable.

***Pammene obscurana* (Stephens, 1834)**

Considered doubtfully Irish by Beirne (1941).

***Pammene trauniana* ([Denis & Schiffermüller], 1775)**

Considered doubtfully Irish by Beirne (1941), who points out that the foodplant, *Acer campestre* L., is not indigenous to Ireland.

***Pammene herrichiana* (Heinemann, 1854)**

A ♂ in poor condition in the Heal collection in NMI may belong to this species. According to the Heal card index the specimen was bred from beech wood (*Fagus*), but although the genitalia have been checked, no differences from those of *P. fasciana* (L.) have been detected and the specimen cannot determined with certainty.

***Pammene germmana* (Hübner, 1799) (*P. germarana* (Hübner))**

According to Beirne (1941) "the record is probably correct, but confirmation is desirable."

***Dichrorampha flavidorsana* Knaggs, 1867**

According to Hancock (pers. comm.) records of this species in Beirne (1941) are confused with *D. petiverella* (L.), *D. alpinana* (Treitschke) and *D. gueneeana* Obraztsov. *D.*

flavidorsana should therefore be deleted from the Irish list.

***Dichrorampha senectana Guenée*, 1845**

Beirne (1941) considers that confirmation of the Irish occurrence was desirable. No Irish specimens have been found in the NMI collections.

***Dichrorampha sedatana* Busck, 1906 (*D. saturnana* auctt.)**

Beirne (1941) has "Included as doubtful". It is however possible that the record should refer to *D. plumbana* (Scopoli). The record in Agassiz (1988) is based on a misdetermination of a specimen of *D. plumbana*.

Choreutidae

***Choreutis pariana* (Clerck, 1759)**

Beirne (1941) accepted the Irish records, but added "Evidently local. No specimen in the Foster collection". As there have been no further Irish records and no Irish specimens have been traced, the species is now considered only doubtfully Irish. Emmet (1991a) does not indicate an Irish distribution for this species.

Pterophoridae

***Oxyptilus pilosellae* (Zeller, 1841)**

Beirne (1941) lists two doubtful records which he considers to be "almost certainly incorrect".

***Platyptilia ochrodactyla* ([Denis & Schiffermüller], 1775)**

As indicated by Beirne (1941), most or all of the older records of this species refer to *Platyptilia pallidactyla* (Haworth), thus there are no confirmed Irish records of this species.

***Stenoptilia graphodactyla* (Treitschke, 1833)**

Records of this species in Beirne (1938) refer to *Stenoptilia saxifragae* Fletcher (see Beirne, 1941).

***Stenoptilia zophodactylus* (Duponchel, 1840)**

Beirne (1941) considered the Irish records of this species to be "very doubtful".

***Pterophorus baliodactylus* Zeller, 1841**

Beirne (1941) doubts the Irish origin of the specimens in the Russ collection.

***Pterophorus galactodactyla* ([Denis & Schiffermüller], 1775)**

Beirne (1941) treats the Irish records of this species as "doubtful".

***Leioptilus lienigianus* (Zeller, 1852)**

The Irish records of this species are either unreliable, or based on misdeterminations (Beirne, 1941).

Pyralidae

***Mellisoblaptes zelleri* (Joannis, 1932)**

Beirne (1941) considered that the Irish record (as *Lamoria anella* ([Denis & Schiffermüller])) in Leech (1886) probably referred to *Mellisoblaptes zelleri*, but that it was almost certainly incorrect, as no source for the record could be traced.

***Oncocera semirubella* (Scopoli, 1763)**

Beirne refers to a specimen in the Kane collection which he has seen, but adds "confirmation is desirable".

***Gymnancyla canella* ([Denis & Schiffermüller], 1775)**

Beirne (1941) considers that the Irish status of this species is "doubtful".

***Homoeosoma sinuella* (Fabricius, 1794)**

Beirne (1941) considers that the Irish status of this species requires confirmation.

***Homoeosoma nimbella* (Duponchel, 1836)**

There appear to be no confirmed Irish records of this species. Beirne (1941) points out that most, if not all, of the Irish records may refer to *Phycitodes saxicola* (Vaughan).

***Orthopygia glaucinalis* (Linnaeus, 1758)**

Beirne (1941) lists records which he considers to be doubtful.

***Endotricha flammealis* ([Denis & Schiffermüller], 1775)**

Beirne (1941) lists one record which he considers doubtful.

***Crambus silvella* (Hübner, 1813)**

Beirne (1941) considered that the Irish records of this species were in need of confirmation. The general collection in NMI contains eight specimens, of which five are labelled "New Forest" and the other three lack locality labels.

***Crambus pratella* (Linnaeus, 1758) (*C. dumetellus* (Hübner, 1813))**

Beirne (1941) accepted the Irish records, but added "perhaps confused with *pratellus*". In the general collection at NMI there are ten specimens under this name, of which four, all bearing the locality label "Scotland", are correctly named. The remaining six, of which two have Irish

locality labels, all belong to the dark form of *C. lathoniellus* (Zincken) (=*C. pratellus* sensu auctt.). *C. pratella* (Linnaeus) should therefore be removed from the Irish list.

***Crambus hamella* (Thunberg, 1788)**

Beirne (1941) considered that Birchall's record (1866-67) of this species required confirmation. The NMI general collection contains seven specimens under this name, of which only one bears a locality label ("King's Lynn").

***Eudonia murana* (Curtis, 1827)**

Beirne (1941) considered that the Irish status of this species is doubtful.

***Pyrausta aurata* (Scopoli, 1763)**

Beirne (1941), while listing three published records, considered that confirmation of the occurrence of this species in Ireland was needed, pointing out that he could find no specimen in the Johnson collection.

***Pyrausta nigrata* (Scopoli, 1763)**

Beirne (1941) considered that the Irish records of this species were not reliable.

***Loxostege sticticalis* (Linnaeus, 1761)**

Beirne (1941) considered that the Irish records of this species were not reliable.

***Sitochroa verticalis* (Linnaeus, 1758)**

Beirne (1941) considered that the Irish records of this species were not reliable.

***Mutuuraia terrealis* (Treitschke, 1829)**

Beirne (1941) considered that the Irish records of this species were not reliable.

***Udea alpinalis* ([Denis & Schiffermüller], 1775)**

Canning's record (1866) of this species (as *Scopula alpinalis*) refers to *Nomophila noctuella* ([Denis & Schiffermüller]) (see Kane, 1901; Beirne, 1941).

***Agrotera nemoralis* (Scopoli)**

Beirne (1941) considered that this species, in spite of two old records, has a very slender claim to the Irish list.

Notes on the check-list

Abbreviations: f. = form; missp. = misspelling: NMI = National Museum of Ireland, Dublin; NMS = National Museums of Scotland, Edinburgh; TCD = Lepidoptera collection in Zoology Department, Trinity College, Dublin.

1. Bradley (1952). Irish occurrence omitted by Heath (1976).

2. Mere and Pelham-Clinton (1966).

3. Bond (1984a). Beirne (1941) quotes records of *E. semipurpurella* and *E. unimaculella* by Birchall (1866-67), but adds "confirmation is desirable".

4. Mere and Pelham-Clinton (1966).

5. Emmet (1971). Also recorded by Bradley (pers. comm.): mines on *Betula*, Boulevan, Co. Clare, viii.1969.

6. Emmet (1981).

7. Emmet (1971). Also recorded by Bradley (pers. comm.): mines on *Betula*, Boulevan, Co. Clare, viii.1969, ♂ emerged 3.v.1970.

8. Emmet (1981).

9. Emmet (1971).

10. Speight and Cogan (1979).

11. Bradley and Pelham-Clinton (1967).

12. Emmet (1981).

13. Emmet (1970a).

14. Emmet (1975a).

15. Emmet (1971).

16. Emmet (1975b). Also recorded by Bradley (pers. comm.): Boulevan, Co. Clare, viii.1969.

17. Bradley and Pelham-Clinton (1967).

18. Emmet (1975b).

19. Bradley and Pelham-Clinton (1967).

20. Recorded by Emmet (1976) as a good species, but now considered to be a form of *S. salicis* (Johansson *et al.*, 1990).

21. Emmet (1975b).

22. Bond (in press).

23. Emmet (1981).

24. Emmet (1981).

25. Emmet (1981).

26. Emmet (1975b). Now considered to be a form of *S. aurella* (see Emmet, 1991a).

27. Bradley and Pelham-Clinton (1967).

28. Now considered to be a form of *S. splendidissimella* (see Emmet, 1991a).

29. Emmet (1981).

30. Bradley and Pelham-Clinton (1967).

31. Mere *et al.* (1962). Now considered to be a form of *S. poterii* (see Johansson *et al.*, 1990).

32. Beirne (1944).

33. Emmet (1981).

34. Emmet (1975b).

35. Emmet (1975b).

36. Recorded from area I (Munster) and J (Connaught) by Emmet (1991a). Emmet (1981) had written "I am strongly of the opinion that ... *S. svenssoni* (Johansson) occurrs not uncommonly."

37. Emmet (1971).

38. Emmet (1975b).

39. Emmet (1975a).

40. Bradley and Pelham-Clinton (1967).

41. Mere *et al.* (1964).

42. Emmet (1971); also recorded by Bradley (pers. comm.): mines on *Malus*, Ballynalackan Castle garden, Co. Clare, vi.1970.

43. Shackleton (1977) (det. Emmet).

44. Bond and van Nieukerken (1987).

45. Emmet (1981).

46. Shackleton (1977) (det. Emmet). This species was recorded as Irish by Beirne (1941), but in view of uncertainties about earlier determinations, Shackleton's record should be treated as the first confirmed Irish record.

47. Bond (in press).

48. Bond (in press).

49. Heal (1985).

50. Bradley and Pelham-Clinton (1967).

51. Emmet (1973).

52. Mere *et al.* (1964).

53. Emmet (1971).

54. Bland (1984). The record of *Nematopogon pilella* in Heath and Pelham-Clinton (1976) refers to this species (Bradley, pers. comm.).

55. Bond (1982). Beirne (1941) considered the three earlier Irish records unreliable.

56. Mere *et al.* (1964). There is also a specimen in the King collection (Glasgow University) labelled "Enniskerry - Wicklow July 3-14 1876" (Knill-Jones, pers. comm.).

57. Bradley and Pelham-Clinton (1967). Hodgkinson (1868) recorded this species from Howth, Co. Dublin, but Beirne (1941) considered this record doubtful pending confirmation.

58. The Irish occurrence is not indicated in Emmet (1991a).

59. The name *herminata* (Geoffroy, 1785) is used in Hättenschwiler (1985) and Emmet (1991a).

60. The status of this parthenogenetic species is uncertain (Emmet, 1991), and it is possible that it is a form of the bisexual species *L. lapidella* (Goeze, 1783), under which name Beirne (1941) recorded it.

61. Beirne (1941); Huggins (1953). The Irish records quoted by these authors are not indicated in Emmet (1991a), although they are included by Hättenschwiler (1985).

62. Bond (in press).

63. Pelham-Clinton (1985b). Beirne (1941) considered that a Co. Kerry record needed confirmation.

64. Pelham-Clinton (1985b) implied that the Irish records needed confirmation, but Beirne had dissected two of the Murray specimens in TCD. There are also more recent confirmed records from mid-Cork (Bond, in press).

65. Pelham-Clinton (1985b) confirms the Irish status of this species. Beirne (1941) had considered the one Irish record known then as doubtful. The details of the Clare record are:

Boulevan (Burren), Co. Clare, 8-18.viii.1969 (Bradley, pers. comm.).

66. Chalmers-Hunt (1982). This record is not included in Pelham-Clinton (1985b).

67. Bond (in press).

68. Beirne's (1941) records of *Monopis ferruginella* (Hübner) (=*Monopis obviella* [Denis & Schiffermüller]) refer to *Monopis crocicapitella* (Clemens); see Pelham-Clinton (1985b).

69. Agassiz (1982).

70. Robinson (1979).

71. Emmet *et al.* (1985) state that this species occurs wherever its foodplant (*Alnus glutinosa* (L.) Gaertn.) is found throughout the British Isles, and their accompanying map indicates records from twelve Irish vice-counties. Beirne (1941) stated that this species was widely distributed in Ireland. However, when Beirne wrote, *Caloptilia elongella* and *C. betulicola* were not recognised as separate species. Published records include Mere and Pelham-Clinton (1966); Ellerton (1967) and Emmet (1968).

72. The only published record appears to be that of Langmaid (1989) from West Mayo. In addition, the distribution map in Emmet *et al.* (1985) indicate records from North Kerry, Offaly, Wicklow and Armagh. Records in Beirne (1941) of *C. elongella*, *q. v.* could refer to either that species or *C. betulicola*.

73. Chalmers-Hunt (1982).

74. Emmet *et al.* (1985); the text refers to Meath (H22), but this should be Westmeath (H23), as shown on the distribution map (Emmet, pers. comm.).

75. Mere *et al.* (1964).

76. Bradley and Pelham-Clinton (1967).

77. Emmet (1971).

78. There has been much confusion over the identity of this species, *Ph. blancardella* and *Ph. cydoniella* (see Beirne, 1941). Confirmed Irish records are given by Bond (in press).

79. Records for this species and *P. cydoniella* may be confused in Beirne (1941); confirmed Irish records are listed in Bond (in press).

80. Confirmed records are listed in Bond (in press).

81. Confirmed by Beirne (1945a). Beirne (1941) had considered that the record of Hogan (1855) was in need of confirmation.

82. Beirne (1945a).

83. Bradley and Pelham-Clinton (1967).

84. Emmet (1971).

85. Emmet (1970b, 1975a).

86. According to Emmet *et al.* (1985) the only Irish record is that of Bradley and Pelham-Clinton from the Burren (1967). The species is not however recorded in that paper, but Irish records are summarised in Bond (in press).

87. Mere *et al.* (1964).

88. The record in Mere *et al.* (1964), and in Bradley and Pelham-Clinton (1967) is based on a misidentification (Bradley, pers. comm.). More recent confirmed records are found in Bond (in press).

89. Bradley and Pelham-Clinton (1967). The record of *Phyllonorycter froelichiella* (Zeller) in Bradley and Pelham-Clinton (1967) also refers to this species (Bradley, pers. comm.). Beirne (1941) had considered that confirmation of the record in Partridge (1895) was desirable.

90. Beirne (1945a).

91. Bond (in press).

92. Bond (in press).

93. Bradley and Pelham-Clinton (1967).

94. Emmet (1971).

95. Langmaid (1989); also recorded from Douglas, mid-Cork, by Bond.

96. Beirne (1941) treated this species as an apple-feeding race of *Y. padella*.

97. Mere *et al.* (1962).

98. Mere *et al.* (1964).

99. Beirne (1941) considered the single old Irish record of *O. piniariella* to be in need of confirmation, but at that time this species and *O. friesei* had not been separated. The differences between the two species are described by Svensson (1966). Confirmed Irish records of both species are found in (Bond, in press).

100. Bond (1991a).

101. Beirne (1941) considered the Irish status to be doubtful pending confirmation, due to uncertainties about the identification. Beirne (1945a) reported "*Ochsenheimeria birdella*

(*bisontella*)" from Cos Laois and Wicklow, which may refer to this species. According to Emmet (1985), Beirne's records are now accepted "since its presence there has now been confirmed". The only published Irish record I can find is Bond (1989). Determination of Ochsenheimeriidae has been based on Karsholt and Schmidt Nielsen (1984) and Svensson (1985).

102. Bond (in press).

103. Mere *at al.* (1964). The Irish record is not included in Emmet (1991a).

104. Emmet (1985). Text refers to Co. Wexford, but this should be Co. Waterford, as shown on the distribution map (Emmet, pers. comm.).

105. Bradley and Pelham-Clinton (1967).

106. Bradley (1953a).

107. Mere *et al.* (1964).

108. Bond (in press). Beirne (1941) wrote of the two old records that "confirmation is desirable".

109. Bond (in press); "doubtful' in Beirne (1941).

110. Bradley and Pelham-Clinton (1967); in addition there is a specimen in NMI labelled "Errislannan" and "Cusack".

111. Classey and Goater (1951); Bradley and Pelham-Clinton (1967). The specimen referred to in Beirne (1941) was not found in TCD in the Murray collection by the author.

112. Harper (1993).

113. Beirne (1941) indicated that the only Irish specimen he had seen was a very worn specimen from Armagh, which he considered could have been misidentified. There are confirmed records from the Burren, Co. Clare (Bradley, 1953b) and south-east Galway (Heckford and Langmaid, 1991).

114. Chalmers-Hunt (1982).

115. Bond (in press).

116. This species should be indicated in area H (Leinster) in Emmet (1991a).

117. This species should be indicated in area K (Ulster), not H (Leinster) in Emmet (1991a).

118. Mere and Pelham-Clinton (1966); there are several further records from widely spread localities (Bond, unpubl.).

119. Bond (in press).

120. Recorded from the Burren, Co. Clare, by Bradley and Pelham-Clinton (1967). Birchall (1866-67) recorded *Elachista pollinariella* from Howth, while Hodgkinson (1868) recorded *E. collitella* from the same locality. British records of *E. pollinariella* are now considered to refer to *E. subocellea* (Stephens), while *E. collitella* (Duponchel) is considered to be a junior synonym of the same species. Beirne (1941), treating *E. pollinariella* and *E. colitella* as distinct species, considered that the Irish records of both were doubtful. *E. subocellea* has however been recorded recently from Howth by Bond (unpubl.).

121. Bond (in press). Hogan (1854) recorded *Elachista triseriatella* from Howth, Co. Dublin, and Beirne (1941) treated this record as referring to the very similar *Elachista dispunctella* (Duponchel) with which it had been confused, but also considered the record doubtful. According to Bland (Emmet, *in litt.*), the other Irish records of *E. dispunctella* (Bradley and Pelham-Clinton, 1967; Heckford and Langmaid, 1988) also refer to *E. cahorsensis*.

122. Bond (in press). This species was considered doubtfully Irish by Beirne (1941).

123. Bradley (1953a). The Irish records were considered doubtful by Beirne (1941).

124. Bond (1984b).

125. Bond (in press).

126. Bradley and Pelham-Clinton (1967); there is also a ♂ in the B. P. Beirne collection in NMI, labelled "L. More, Glengarriff, 17.vii.47" (Co. Cork) (genitalia checked, KB).

127. Mere *et al.* (1964) (as *Elachista nigrella* (Haworth). Beirne's (1941) records of "*Elachista consortella* Stt." refer to both *Cosmiotes freyerella* and *C. consortella*, which were at that time not recognised as distinct species (see Bradley (1952)).

128. Bradley (1952).

129. Bond (in press). All of Beirne's (1941) records of this species so far checked refer to *C. flavipennella*.

130. Most or all of the records of *Eupista lutipennella* Zeller in Beirne (1941) refer to this species.

131. Bond (in press). The records of *Eupista nigricella* Stephens in Beirne (1941) probably refer to this species, and the same applies to Barrett's record (1885) of *C. nigricella* "along hawthorn hedges".

132. Bradley (1952).

133. Mere *et al.* (1964); Emmet (1971).

134. Recorded by Bradley and Pelham-Clinton (1967). There is also one Beirne ♀ genitalia slide of this species in NMI (checked KGMB), but as the specimens are missing it is not known to which record the slide refers. This and the closely related species (*C. frischella* and *C. deauratella*) have been much confused in the past, and the partial absence of both the specimens and the genitalia slides has meant that most of the older records cannot be checked.

135. Recorded by Beirne (1941), but only one of his two remaining genitalia slides of this species is correctly labelled, the other being *C. trifolii* (*q. v.*). Also recorded by Bradley and Pelham-Clinton (1967), but dissections of some of their specimens show them to be *C. deauratella*; while their record of larval cases on *Centaurea nigra* L. appears to refer to *C. paripennella* Zeller. The species was also recorded by Emmet (1971), but his record of *C. nigra* as foodplant also indicates that *C. paripennella* is intended.

136. Bond (in press). Beirne (1941) had considered that Barrett's record (1861b) of this species (as *olivacella* missp.), also from the cliffs at Howth, Co. Dublin, to be doubtful pending confirmation. "The 'I' in the distribution column in Emmet (1991a) is a misprint for 'H'" (Emmet, pers. comm.).

137. Bradley (1953b).

138. There are two larval cases in NMI labelled "Newcastle marshes [Wicklow]", about which Beirne (1941) had written "confirmation is desirable". The species is also recorded by Emmet (1968), and by Bradley (pers. comm.): Boulevan, Co. Clare, one ♂, 18.vi.1970.

139. Bond (in press). The nomenclature of this species and *C. betulella* Heinemann and Wocke is discussed by Emmet (1993).

140. There is a specimen under *Coleophora ibipennella* Zeller from the Burren in the Bradley collection in BM(NH); also recorded by Uffen from the Burren (Emmet, *in litt.*), but this probably refers to the same specimen.

141. Bradley (1952) (as *C. teidensis* Walsingham).

142. Bradley and Pelham-Clinton (1967); considered doubtfully Irish by Beirne (1941).

143. Emmet (1971).

144. The name *tamesis* Waters was removed from synonymy by Baldizzone and Landry (1993).

145. Healy (1977); there are also two specimens from Greencastle, Co. Down in the Heal collection in NMI.

146. Bradley (1960); the record of *C. therinella* by Beirne (1945a) may refer to this species.

147. The records of this and closely related species have been much confused in the past. However the specimens referred to by Beirne (1941) under the synonym *annulatella* Tengström refer to *C. saxicolella* (Duponchel), as do those under *C. flavaginella* in Bradley and Pelham-Clinton (1967) and Emmet (1968, 1971).

148. Bradley (1960).

149. Bond (in press).

150. Mere *et al.* (1964); Bond (1992a).

151. Bradley (1960). Beirne (1945a) refers to a specimen taken which was "probably" *therinella*, but this specimen has not been traced, and the species was confused with *C. peribenanderi* at the time.

152. Bradley (1960).

153. Agassiz (1982). Bradley's record (1952; 1960), as *C. troglodytella* (Duponchel), refers to *C. follicularis* (Vallot).

154. Bradley (1960) (as *C. derivatella* Zeller); (see also *C. troglodytella* (Duponchel)).

155. Bond (1981b).

156. Bradley and Pelham-Clinton (1967). This record is not indicated in Emmet (1991a).

157. Bond (in press). Considered doubtful by Beirne (1941).

158. Mere *et al.* (1964).

159. Bond (1981b). Considered doubtful by Beirne (1941).

160. Emmet (1971). Considered in need of confirmation by Beirne (1941).

161. Chalmers-Hunt (1977).

162. Bond (1991b).

163. Bond (in press).

164. Bradley and Pelham-Clinton (1967).

165. Bradley (1953b). Beirne (1941) considered the that the Irish status of this species required confirmation.

166. Mere *et al.* (1964).

167. Heckford and Langmaid (1988).

168. Bradley (1952). Hogan's record (1855) was considered to be in need of confirmation by Beirne (1941).

169. Mere *et al.* (1964).

170. Bradley (1953b).

171. Bond (in press).

172. Bradley and Pelham-Clinton (1967). The earlier Irish records were considered doubtful by Beirne (1941).

173. Agassiz (1977).

174. Bond (1984b).

175. Bond (in press).

176. Bond (1981b). This species was considered doubtfully Irish by Beirne (1941).

177. Bond (in press).

178. Emmet (1968); also recorded by Bradley (pers. comm.): several, Ballyeighter, Co. Clare, vi.1970. There is a specimen in the Heal collection, previously placed under *Teleiopsis diffinis* (Haworth), labelled ". . . H910610 [Church Hill, Armagh], 24.v.1967". Specimens under this name in the BM(NH) Burren Collection are probably *T. wagae* (Nowicki) (Sattler, pers comm.). This species was considered doubtfully Irish by Beirne (1941).

179. Sattler (1980). Records of *Teleiodes notatella* (Hübner) in Bradley and Pelham-Clinton (1967) refer to this species. See also *T. paripnctella* (Thunberg).

180. Bradley and Pelham-Clinton (1967); Emmet (1971).

181. Bradley and Pelham-Clinton (1967). This species was considered doubtfully Irish by Beirne (1941).

182. Bond (in press).

183. Bond (in press).

184. Mere and Pelham-Clinton (1966). This species was considered doubtfully Irish by Beirne (1941).

185. Bond (1981b).

186. Bond (in press).

187. Dowling (1979).

188. Mere *et al.* (1964); this record is however omitted by Bradley and Pelham-Clinton (1967). In the Pelham-Clinton Irish Collection in NMS, there is one specimen, labelled: "Ballyvaghan, Clare, 12 Jun 1962 ECPC No. 19588", while in the Pelham-Clinton diary, p. 5615, there is an entry of "1 *Phthorimaea acuminatella*" from Doughbranneen on 12.vi.1962, which presumably applies to the same specimen (M. Shaw, pers. comm.). The species has also been recorded from O'Donnell's Rock, G881355, Co. Leitrim, 20.v.1993 (Bond, unpubl.).

189. Mere *et al.* (1964).

190. Bond (in press).

191. Bond (in press).

192. Bond (in press). The records given by Beirne (1941) are based on misdeterminations.

193. Two specimens in NMI previously placed under *Scrobipalpa obsoletella* (Fischer von Röslerstamm) (*q. v.*) have been determined as this species (Karsholt, *in litt.*, 1990). The abdomens are missing, but no genitalia slides have been traced.

194. Bradley and Pelham-Clinton (1967).

195. Emmet (1968).

196. Although the Irish status of this species was accepted by Beirne (1941), he later considered that it "might be bracketed as doubtful" (Beirne, 1942). There is a Beirne specimen in NMI from Bray Head, Co. Wicklow, 1944 (genitalia checked KGMB); this is probably the specimen referred to under *Stomopteryx vorticella* in Beirne (1945a). The species has also been recorded by Bradley (1953b).

197. Agassiz (1982); the date of capture should read "11.viii.1977".

198. Bond (1988); Bond and Good (1989).

199. Mere *et al.* (1964).

200. Bradley *et al.* (1973). The species was also recorded by Heckford and Langmaid (1991). Emmet (pers. comm.) reports two specimens from Ballyeighter Wood, Co. Clare, 10.vii.1973.

201. A specimen in the NMI collections from Howth, Co. Dublin, belongs to this form; the others Irish specimens checked are ssp. *colquhounana* (Barrett, 1884).

202. Bond (1981a). Considered doubtfully Irish by Beirne (1941).

203. Bond (in press).

204. Emmet (1971).

205. Bond (in press).

206. Bond (in press).

207. Healy (1977); also reported by Bradley (pers. comm.): several, Ballynalackan coast road, Co. Clare, vi.1970.

208. Bond (in press).

209. Mere *et al.* (1964). Chalmers-Hunt (1982) refers to a specimen in the General Coll. at NMI.

210. Bond (1979).

211. Beirne (1942) writes ". . . the name *permixtana* Schiff. 1775 has priority over *ciliella* Hübn., 1796", but the valid name for this species is *ruficiliana* (Haworth), and *permixtana* ([Denis and Schiffermüller]) (*q. v.*) is a separate species.

212. Beirne (1945a).

213. Bradley and Pelham-Clinton (1967).

214. Mere *et al.* (1964).

215. Bradley and Pelham-Clinton (1967) (including record of *E. gentianaeana* (Hübner)). Bradley (1953a) recorded "*Endothenia sellana* Hubn." and this record may also refer to *E. marginana*.

216. Bond (in press). The records in Bradley *et al.* (1979) are unconfirmed.

217. Classey and Goater (1951). Beirne (1941) had considered that confirmation of a Russ record from Sligo was desirable.

218. Emmet (1971); Bradley (pers. comm.) reports *Ancylis subarcuana* f. *inornatana*: Burren, Co. Clare, viii.1969.

219. Bond (in press).

220. Ellerton (1967).

221. Mere *et al.* (1964).

222. Bond (in press).

223. Bond (in press).

224. Huggins (1966); Terry (1986). In addition, a ♂ was recorded at the Rothamsted Insect Trap at Fota Wildlife Park, W781713, East Cork, 15.xi.1988.

225. Bradley (1951). Beirne (1941) considered an old record by Dillon (as *Eucosma*

fractifasciana Haworth) to be very doubtful.

226. Agassiz (1982). Further records are: one at light, Dunmurry, J290690, Co. Antrim, 14.viii.1969 (Heal card index); ♂, Nagles Mts, W671947, East Cork, 15.viii.1980; ♀ at light, Killegar Hse, H262063, Co. Leitrim, 17.viii.1992. The use of the name Ratzeburg, rather than Saxesen, follows Emmet (1991b). The same remarks apply to *Cydia coniferana*.

227. Bond (in press). Beirne (1941) considered that the record of this species by Watts (1885) was "probably correct".

228. Bond (1981a). Records in Bradley and Pelham-Clinton (1967) are based on misdeterminations of *G. dealbana* (see Bradley *et al.* (1979)).

229. Bond (in press). Records of *Gypsonoma sociana* (Haworth) and *G. neglectana* (Duponchel) refer to *G. dealbana* (Frölich).

230. Bradley and Pelham-Clinton (1967); Bond (1981a).

231. Beirne (1945a).

232. Bradley (1952).

233. Bond (in press). This species was previously considered by some authors to be a form of *S. ocellana* ([Denis & Schiffermüller]).

234. Bond (in press).

235. Bradley *et al.* (1979). Chalmers-Hunt (1982) refers to a specimen in the Stelfox collection in NMI which was taken in 1926.

236. O'Connor and Nash (1982).

237. Heckford and Langmaid (1991). Further records are: 2♀♀, Brittas Bay, T311841, Co. Wicklow, 31.v.1987; ♂♀, Ballyteige, S924067, Co. Wexford, 4.vi.1988; ♂, Donabate Island, O239465, Co. Dublin, 18.vi.1988. Beirne (1941) included this species as "very doubtful", pointing out that "the foodplant *Ononis spinosa*, has not been found in Ireland". However, according to Bradley *et al.* (1979) and Emmet (1991a), the foodplant is *Ononis repens* L.

238. Mere *et al.* (1964); Emmet (1971). Considered "doubtful" by Beirne (1941).

239. Bradley (1953b). Considered doubtful by Beirne (1941).

240. Bond (in press). Beirne (1941) removed this species (as *Laspeyresia aspidiscana* Hübner) from the Irish list.

241. Bradley (1952). Considered doubtfully Irish by Beirne (1941).

242. Bond (in press).

243. Bond (in press).

244. Heckford and Langmaid (1991). The species has also been recorded by Bradley: "Caher river and Newtown Castle [Clare], v-vi.1971" (Bradley, pers. comm.).

245. Mere and Pelham-Clinton (1966). Beirne (1941) considered that confirmation of the Irish status was desirable.

246. Bradley and Pelham-Clinton (1967). Beirne (1941) considered that confirmation of the Irish status of this species was desirable.

247. Bond (in press). Beirne (1941) wrote "confirmation is desirable".

248. Bond (in press).

249. Bradley and Pelham-Clinton (1967).

250. The record of *Tebenna bjerkandrella* (Thunberg) (Bond, 1983) is based on a misdetermination of *T. micalis* (see Heckford, 1990).

251. Bradley and Pelham-Clinton (1967). This record is not indicated in Emmet (1991a).

252. Huggins (1962a). Beirne (1941) listed an earlier record which he considered to be doubtful.

253. The European specimens previously placed under this name have been reported by some authors to consist of several closely related species (see Emmet, 1991a, 1991b). However, genitalia checks of several Irish specimens have not revealed any consistent differences that might suggest that they are specifically distinct from *Stenoptilia bipunctidactyla* (Scopoli) (Bond, unpubl.).

254. Bradley (1953b).

255. Beirne (1941) treats *D. splendidella* (Herrich-Schäffer) and *D. abietella* ([Denis & Schiffermüller]) as separate species. There is however no confirmation of the occurrence of *D. splendidella* in Ireland or Britain (see Emmet, 1988), and the records probably refer to *D. abietella*. Beirne (*loc.cit.*) also refers to a "?*Dioryctria* sp." recorded by Graves (1930). At present *D. abietella* is the only species of this genus confirmed as Irish.

256. This species is listed as *P. diluta* (Haworth) in Emmet (1991a, 1991b).

257. Bradley (1953b). Beirne (1941) treated the Irish records of this species as "doubtful". The species is indicated in Area "J" (Connaught) in Beirne (1941), but confirmed records are from

area "I" (Clare).

258. Bradley (1953b).

259. Bradley and Pelham-Clinton (1967).

260. Agassiz (1977).

261. Huggins (1962b, 1973). Beirne (1941) had considered that the Irish records needed confirmation.

262. O'Connor *et al.* (1990). Beirne (1941) was unable to trace the source of the record in Meyrick (1928). Following dissection, a specimen under this name in the Heal collection in NMI was found to be misidentified.

263. Bond (1992b). Beirne (1941) considered that the Irish records of this species were doubtful. The general collection in NMI contains three specimens, all without locality labels.

264. Agassiz (1977). The record is from distribution area "I", not "J" as indicated in Emmet (1991a).

265. Bond (1979).

266. Bradley (1953b). Beirne (1941) considered the Irish status to be doubtful pending confirmation.

267. Bradley and Pelham-Clinton (1967); Emmet (1971). Chalmers-Hunt (1982) refers to further Irish specimens.

268. Agassiz (1977). The specimen referred to by Haynes and Hillis (1984) therefore does not represent the earliest Irish record.

269. Bradley (1953b). Chalmers-Hunt (1982) refers to an earlier specimen in the Bullock collection. Beirne (1941) had treated the previous Irish records as doubtful.

270. Donovan (1945); Chalmers-Hunt (1982) refers to four specimens in the Baynes coll. at NMI, the earliest bearing the date "1.9.1955". It has more recently been taken in Co. Wicklow (M. de Courcy Williams, pers. comm.).

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